

## Inclusion of consumers in the forming of wood fuel trade market on the pattern of questionaired households

Benjamin LESKOVEC<sup>1</sup>, Iztok WINKLER<sup>2</sup>

### Abstract

The research of wood fuel trade is market management oriented at household level. We devoted our attention to determine the key questions, market segmentation and market potentials. 909 households, which took part in the questionnaire and received financial support to purchase a wood biomass boiler from 2003 until 2006, represented our data source. The analysed pattern of questionaired households indicates a vast unrealized developmental potential at placing additional quantities of chunkwood and forest chips on the market. Own forests still represent the most important heating source in households. Switching to wood biomass heating is practiced particularly by fuel oil consumers. Since the consumer has been placed into the centre of our research, we present some fundamental findings on product making and product development, its price, sale, promotion and management control. Our findings indicate that right business decisions and the ability to adjust to the market fluctuation enable us good developmental possibilities.

**Key words:** wood biomass, wood fuel trade, households, marketing-mix, market management, chunkwood, forest chips, pellets, Slovenia

### *Vključevanje potrošnikov v oblikovanje trga lesne biomase na primeru anketiranih gospodinjstev*

#### *Izveček*

*Raziskava trga lesne biomase je usmerjena v tržno poslovanje na ravni gospodinjstev. Posveča se definiranju ključnih vprašanj, segmentaciji tržišča ter tržnemu potencialu. Vir podatkov je 909 anketiranih prejemnikov finančnih vzpodbud za nakup kotla na lesno biomaso v letih od 2003 do vključno 2006. Vzorec anketiranih gospodinjstev kaže velik in nedosežen potencial pri plasiranju dodatnih količin sekancev in polen na trg. Lasten gozd je še vedno najpomembnejši vir goriva. Prehajanje na ogrevanje z lesno biomaso je največje pri potrošnikih kurilnega olja. Ker je bil potrošnik postavljen v središče raziskave, smo podali temeljne ugotovitve o ustvarjanju in razvoju proizvoda, ceni, prodaji, promociji in kontroli poslovanja. Ugotovitve kažejo, da pravilne poslovne odločitve in sposobnost prilagajanja gibanju trga odpirajo dobre razvojne možnosti.*

**Ključne besede:** lesna biomasa, trg lesne biomase, gospodinjstva, marketing-mix, tržno poslovanje, polena, sekanci, peleti, Slovenija

## 1 Introduction

### 1 Uvod

As a renewable and environmentally friendly source of energy, wood biomass (WB) is an important item in development strategies of developed and environmentally aware societies. But due to previous neglect, our knowledge and expertise of the basic parameters regarding this source is severely inadequate (KRAJNC, N. / PIŠKUR, M. 2006).

It was soon established (WINKLER 1992) that a free market of wood biomass could not be formed overnight. Different issues occurred regarding the extent of necessary wilful and planned effect on the factors, which are set as conditions for the functioning of a complete competition

in the wood biomass market.

Market research is therefore the basic form of activity helping individuals and organisations to attain the necessary information on consumers, competition and distribution channels. The aforementioned information serves as a basis for identifying business problems, discovering opportunities and needs and to control operations.

Our research is focused on market management (marketing), which is directed into satisfying existing and potential consumers. With the aim of achieving this goal, we need to resolve issues marked with the elements of "marketing-mix" (MARUŠIĆ 1989). We will remember them with the help of four initials "4P". These are the

<sup>1</sup> B. L., univ. dipl. ing. gozd., Alma Vidova ulica 12, 6330 Piran, SLO, benjamin.leskovec@replika.si

<sup>2</sup> prof. dr. I. W., BF, Oddelek za gozdarstvo in obnovljive gozdne vire, Večna pot 83, 1000 Ljubljana, SLO, iztok.winkler@bf.uni-lj.si

initials of the four words indicating a larger number of activities, namely Product, Price, Place and Promotion.

The first element is the Product and it indicates the activities regarding planning and development of an individual product. The second element of the "marketing-mix" is the selling price. The price is extremely important since the correct formulation and price policy are crucial for a good financial state with regards to the conditions present in the market. The fact remains that the buyers and the sellers behave in a rational way (LAVRAČ 1979).

The third element is the place marking the activities. The goal of the activities is to bring the products intended for the market to the place where the exchange takes place. "Promotional activities" are the fourth element and are apparent in different forms, namely as: economic messages, publications, public relations and other.

So the main focus is on the consumer since the primary task of market management is the fulfilment of his needs. This fulfilment is achieved with the aforementioned combination of the "marketing-mix": by creating and developing a product, with a price that will be acceptable to the broadest possible range of users, with a well organized sale and with the help of a satisfactory promotion.

## 2 Previous studies

### 2 Dosedanje raziskave

Studies from the field of developing systems of determining forest owners based on external factors (BOHLIN, F. / ROOS, A. 2002) and achieving a durable management (MÄLKKI, H. / VIRTANEN, Y. 2003) are found at the forefront of the research after 2000.

Since Sweden, Austria and Finland are the leading countries in the field of wood biomass development in the European Union, it is understandable that the latest studies come from these countries. And so a unique computer-supported programme has been developed and it helps the forest owners to decide how to use wood biomass for energy purposes in their forests (RÖSER and associates 2006).

Thorough analyses on key development factors of use of wood biomass from the forest for energy purposes have been conducted in Finland (HAKKILA 2006) as well as in Sweden (BJÖRHEDEN 2006).

We can expect first increases of use and the awakening of the wood fuel trade, especially in the European Union countries (HILLRING 2006). We can keep this sort of estimate due to encouraging results of a study on 20-years countryside development experience and the use of wood biomass in Sweden (HILLRING 2002).

The studies in Slovenia in the field of potential estimates, broader use and other influences of increased use of wood biomass for energy purposes took part within the framework of research carried out at the Slovenian Forestry Institute, Faculty of Mechanical Engineering,

Slovenia Forest Service and at the Department of Forestry and Renewable Forest Resources at the Biotechnical Faculty.

Very little research work has been implemented on the forming and following of wood fuel trade at the level of the consumer, or this sort of work has been accomplished only partially and incompletely within individual research projects. Due to the sustainable manner of forest management in Slovenia, several foreign findings are unsuitable or can only be used to a limited extent.

## 3 Object of the study

### 3 Objekt raziskovanja

The objects of the study were 909 recipients of financial support (Table 1) for the purchase of a wood biomass boiler from 2003 to 2006. The addresses of the questioned households have been emailed to us by M.A. Jani Turk from the Sector for Activities of Efficient Use and Renewable Energy. 565 households responded to the inquiry. The participants also represent the households of individual apartment houses in Slovenia.

**Table 1:** Total number of questioned households that have received financial support to buy a wood biomass boiler (from 2003 to 2006)

*Preglednica 1: Celotno število anketiranih gospodinjstev, ki so v letih od 2003 do vključno 2006 prejeli finančne vzpodbude za nakup kotlov na lesno biomaso*

Wood biomass <i>Lesna biomasa</i>	Year <i>Leto</i> 2003	Year <i>Leto</i> 2004	Year <i>Leto</i> 2005	Year <i>Leto</i> 2006	TOGETHER <i>SKUPAJ</i>
Chunkwood / <i>Polena</i>	72	69	114	334	589
Pellets / <i>Peleti</i>	11	10	22	164	207
Forest chips / <i>Sekanci</i>	21	33	18	41	113
SUM / <i>SKUPAJ</i>	104	112	154	539	909

The basic data was acquired by questioning reference people in the households, who were mainly responsible for the decision to purchase a wood biomass boiler, which uses chunkwood, forest chips or pellets as a heat source. The reference person in the completed questionnaires was in 87.8% male and in 12.2% female.

## 4 Objectives

### 4 Namen raziskave

Knowledge of market potential is crucial in any organisation. Defining the market potential is especially useful when determining areas of sale and the necessary quantities of the product.

The prediction of the sale is therefore one of the most important activities in the market operation, since all the production, trade and service activities depend on a successful sale. That is why the main goal we are trying

to achieve by anticipating consumption and sale lies in the determination of the quantities of the product, which we are trying to launch on a specific market in a specific period.

Here two basic questions arise, which we are trying to solve, and these are: "Who are our potential consumers?" and "What is the quantity of the product the consumers will actually need?" The first question applies to the consumers segment (target group), while the other question applies to our prediction of the consumption.

After the process of denationalisation of the forests, it is more than obvious that an owners' structure is formed, which has a very important market share and special forms of market behaviour due to the property and production size and different economical reasons.

An essential part of the study is therefore concentrated on the market segmentation, which is an old unknown element of marketing and cannot be easily solved. A clearly defined segment of consumers of our products and the knowledge of necessary characteristics are namely the key to a successful business operation.

After a clearly defined consumer segment and the determination of its size, marketing becomes easier as far as the definition of the product, its price, sale, promotion and control are concerned. And the latter factors present the central part of our study.

## 5 Methods

### 5 Metode dela

The process of market research demands a logical sequence of activities leading us to information for making business decisions in the field of wood fuel trade. The definition of key questions was the first task of the research process and this was followed by definition of data type and origin.

The questions in the form apply to sex, education and the status of the reference person. The questions also deal with access to information, recognition of organization work, sources of information, suitability of various forms of expert help, ways of attaining and the reasons for choosing wood biomass heating. We also concentrated on questions related to price, transportation, supply and the amount of wood biomass required for heating. Part of the questions deal with the duration of the heating season, the size of the living area, thermal insulation of the house, the use of solar collectors and the importance of wood biomass in the household.

We used the "approach with the help of the consumer's characteristics" to determine and measure the market segment and this is based on characteristics arising from biographical (e.g. climate, region), demographic (e.g. sex, age, education) and psychological factors (e.g. motives, mentality, belief).

565 households (Table 2) or completed sealed questionnaires (62.2% of all received) with 22 questions,

which we sent via the mail, represented the research pattern. The majority of the questions required one or three possible answers at the most, with some of the questions requiring a short and simple answer. If none of the options proved to be suitable, the answer was written under "Other".

**Table 2:** Number of returned questionnaires in view of individual wood biomass type and years

**Preglednica 2:** Število vrnjenih anketnih vprašalnikov po vrsti lesne biomase in letih

Wood biomass <i>Lesna biomasa</i>	Year <i>Leto</i> 2003	Year <i>Leto</i> 2004	Year <i>Leto</i> 2005	Year <i>Leto</i> 2006	TOTAL <i>SKUPAJ</i>
Chunkwood / <i>Polena</i>	44	42	61	220	367
Pellets / <i>Peleti</i>	4	7	12	105	128
Forest chips / <i>Sekanci</i>	13	25	11	21	70
SUM / <i>SKUPAJ</i>	61	74	84	346	565

This was followed by the entry of the data into an Access data base, programming, analysis and interpretation of the data collected in the field. The data was presented in tables, then the percentage was calculated and other indicators determined.

At the end we made 50 clear Excel tables with product presentations in a form, which is suitable for many creators and members of the wood fuel trade in Slovenia. But this is merely the beginning of chain reactions for the marketing as a whole and this will help to set up a transparent wood fuel trade in Slovenia.

## 6 Results and discussion

### 6 Rezultati in razprava

To start with, we will state the typical questions that we need to answer with market research and which occur in the phase of research planning and defining. We will answer these questions on a smaller scale due to the limited funds and time.

1. What are the development tendencies in domestic production regarding other countries? How will this affect the market of our product?
2. What are the expected changes in the customer's behaviour?
3. What are our future needs regarding sales personnel, representatives, distribution centres and storage facilities?
4. What are the chances of opening new markets? What sort of products and services will be required to meet their demands? Can the markets, in which business is now being conducted, offer good perspectives?
5. Are there more effective channels of distribution for the product we are selling? What are the predictions and possibilities of launching our products in other countries?

An insight in certain tendencies and characteristics of development in the field of wood biomass among the questioned households in Slovenia reveals that the better part of 95% of the participants are inclined towards modernization and development of bigger wood biomass systems for remote settlement heating (Table 3). They estimate with fewer than 95% that the trend of wood biomass use will increase in the future (Table 4). The latter is an indirect indicator of good development chances of wood fuel trade in Slovenia.

**Table 3:** Modernization support and development of bigger wood biomass systems for remote settlement heating among questioned households (expressed in percentage)

**Preglednica 3:** Podpora posodobitvam in izgradnji večjih sistemov na lesno biomaso za daljinsko ogrevanje naselij (DOLB) med anketiranimi gospodinjstvi, izražena v odstotkih

Support / Podpiram	No support / Ne podpiram
95.4%	4.6%

With Table 3, one evidently needs to consider that a high support in favour of remote settlement heating systems does not necessarily mean that the households are willing to connect to such systems.

**Table 4:** Evaluation of wood biomass future use in questioned households (expressed in percentage)

**Preglednica 4:** Ocena trenda rabe lesne biomase v prihodnje med anketiranimi gospodinjstvi v odstotkih

Increase / Povečala	Same level / Na isti ravni	Decrease / Zmanjšala
94.2%	5.3%	0.5%

Also, if we take a look at the state of wood biomass for the whole of Slovenia, we can ascertain that wood biomass is at the forefront as the only heating source with the questioned households (Table 5). Apart from the aforementioned, very clear tendencies of the future development can be seen in Table 1, which also shows a very high increase in the number of new pellet boilers in the last year and an increasing trend of new chunkwood boilers.

**Table 5:** Position of wood biomass as heating source in Slovenian regions

**Preglednica 5:** Položaj lesne biomase kot vira ogrevanja v gospodinjstvih po slovenskih regijah

	Only source / Edini vir	Main source / Glavni vir	Second source / Drugi vir
TOGETHER / SKUPAJ	72.6%	26.7%	0.5%

The estimated needed amount of used individual type of wood biomass (Table 6) can at least partially tell us the consumption of the households during the heating season. Of course we need to consider the estimated quantities in a limited extent due to the fact that in several cases the questioned households did not clearly specify the exact volume, cubic or linear metres of wood biomass. With pellets and forest chips, the participants even manipulated last year's heating season stock. We will get a better insight into the household consumption for a single heating season in the future when we specify the use in m<sup>2</sup> of heated living area.

**Table 6:** Evaluated average and needed wood biomass quantity for the heating season in questioned households

**Preglednica 6:** Ocenjena povprečna in potrebna količina lesne biomase v anketiranih gospodinjstvih za eno kurilno sezono

		Stacked volume meter / prm
Chunkwood / Polena	18.5	
Pellets / Peleti	4,860.3	kg
Forest chips / Sekanci	60.9	m <sup>3</sup>

## 6.1 Product

### 6.1 Proizvod

When we are designing end products, we at least partially wish to answer the following questions because they will lead us to a consumer-friendly product.

1. What are the specific characteristics of our end product? What type of existing product seems the most successful one?
2. How will we offer the product on the market?
3. What is the reason for bad sales results? The product itself? The nature of our service? Which are the necessary changes?

In this part, the most important information can most clearly be evident in the key reasons when deciding on wood biomass heating for individual households (Table 7). With 52.6% of the answers, the most relevant reason in the last year is clearly the increasing cost of other rival energy sources.

An important piece of information is seen in the fact that as many as 37.8% of the questioned households use beech chunkwood (Figure 1). This information is of vital importance to anyone launching beech chunkwood in wood fuel trade.

**Table 7:** Key reasons for wood biomass heating per individual years in questioned households**Preglednica 7:** Ključni razlogi za ogrevanje na lesno biomaso v anketiranih gospodinjstvih po posameznih letih

Year Leto	Wood biomass price Cena LB	Fin. support Fin. spodbuda	Own source of WB Lasten vir LB	Supply - Accessible Oskrba-Dostopnost	Environ. friendly Okolju prijazno	Growing prices of energ. Rast cen energ.	Modern boilers Sodobni kotli
2003	32.8%	36.1%	55.7%	24.6%	31.1%	26.2%	44.3%
2004	24.3%	35.1%	58.1%	23.0%	40.5%	25.7%	48.6%
2005	29.8%	29.8%	44.0%	26.2%	48.8%	33.3%	38.1%
2006	37.9%	39.9%	37.9%	12.4%	36.1%	52.6%	35.0%

**Figure 1:** Prevailing tree type among the questioned households using chunkwood

**Slika 1:** Prevladujoča drevesna vrsta med tistimi anketiranimi gospodinjstvi, ki kot kurivo uporabljajo polena

Further product development will be significantly influenced by the average power of heating devices on wood biomass, the duration of the heating season, the average size of the heated living area and the aforementioned estimated consumption of individual type of wood biomass per m<sup>2</sup> of heated living area.

And so the average power of heating devices totals to 24 kW with pellets, 25 kW with chunkwood and 46 kW with forest chips. The average duration of the heating season is in the interval of 6.2 and 6.5 months. The shortest heating seasons are expected in the regions of Goriško and Primorska.

The average size of a heated living area in m<sup>2</sup> has been decreasing in the years of the research but it still surprisingly totals 198 m<sup>2</sup> in the analysed households. And so the Podravska (229 m<sup>2</sup>), Savinjska (222 m<sup>2</sup>) and Pomurska region (203 m<sup>2</sup>) still have the biggest average size of a heated living area. The latter is, from the energetic point of view, aimless, but from the perspective of the spatial possibilities and especially the rural area accompanied by farm buildings it is easily understandable. It is possible that due to the aforementioned spatial possibilities and tradition, the energetically lowest average size of a heated living area can be found in Primorska (151 m<sup>2</sup>) and Goriško region (156 m<sup>2</sup>), which are furthermore accompanied by a milder climate.

If we look at the 2002 census, we can determine that the average size of a heated living area in Slovenia is

around 75 m<sup>2</sup> (SURS 2002), nearly three times less than in the questioned households. Our research nevertheless confirmed the theory on wood biomass use in our research, which states that the users of pellets have the smallest and the users of forest chips the largest heated living areas (KRANJC 2005). We determined that, regarding the questioned households, the users of pellets have the smallest (165 m<sup>2</sup>) and the users of forest chips the largest (268 m<sup>2</sup>) heated living areas. The average heated living area with users of chunk wood is 182 m<sup>2</sup>.

Regardless the aforementioned findings of the study, it would be correct to point out the estimated use of individual type of wood biomass per m<sup>2</sup> of heated living area. The latter amount to: 0.1 prm/m<sup>2</sup> for chunkwood, 0.22 m<sup>3</sup>/m<sup>2</sup> for forest chips and 29.34 kg of air dried wood per m<sup>2</sup> of heated living area in a single heating season. Despite the importance, we cannot make a definition with chunkwood and forest chips regarding air dried or fresh wood considering that the participants gave no special attention to this question.

The consumption of energy gained from wood biomass in the questioned households can also be expressed in kWh/m<sup>2</sup>. The yearly consumption of energy is the highest with forest chips (176 kWh/m<sup>2</sup>) and chunk wood (175 kWh/m<sup>2</sup>), and it slightly drops with pellets (144 kWh/m<sup>2</sup>). Regarding the average yearly consumption of energy per m<sup>2</sup> in Slovenia, which is rated between 150 and 180 kWh/m<sup>2</sup> (AL-MANSOUR and associates 2002), the consumption of energy in the analysed households falls within this interval.

## 6.2 Price

### 6.2 Cena

Wood is the only energy source, which is privately owned and can be bought off the market at considerably lower prices, or can even be attained at no cost if one makes its own firewood and if we disregard the cost of labour and wood. Questions regarding the price are therefore even more important.

1. What is the price we set for the product?
2. What sort of price differences can we anticipate within one product?
3. Will we change the price when the production costs go down?

**Table 8:** Individual wood assortment average price on wood fuel trade as evaluated by questioned households in Slovenian regions (expressed in EUR)

**Preglednica 8:** Povprečna cena posameznih vrst gozdnih sortimentov na trgu lesne biomase po oceni anketiranih gospodinjstev v slovenskih regijah, izražena v EUR

Regions / Regije	Chunkwood Polena EUR/prm	Pellets / Peleti EUR/kg	Forest chips Sekanci EUR/m <sup>3</sup>	Log wood Cepanice EUR/prm	Logging residues Okroglice EUR/prm	Rounwood Okrog. les EUR/ prm	Stemwood Goli EUR/m <sup>3</sup>
Dolenjska	54.25	0.20		45.90	37.56		60.09
Gorenjska	50.54	0.21	11.48	54.25		52.16	45.90
Goriška	49.61	0.20	11.52	45.90			41.73
Koroška		0.24	13.35				50.08
Notranjska		0.20		41.73			
Osrednja	53.59	0.22	12.46	48.68	41.73		48.51
Podravska	47.57	0.23	12.52	43.82			43.12
Pomurska	44.86	0.22	20.45	44.51		54.25	
Posavska		0.21		50.08		31.30	50.08
Primorska	47.99	0.21					29.21
Savinjska	54.25	0.21	12.52	50.08		62.59	47.99
Zasavska	54.25	0.26					
SUM / SKUPAJ	51.16	0.21	14.01	47.36	39.64	50.49	46.79

The prices of the firewood or chunkwood shown in Table 8 of course only apply to those users who need to purchase the firewood in the market. We estimate that these users only amount to a few percent, which can also be confirmed by the empty spaces in Table 8. Most users of this source namely heat the premises at a significantly lower cost, some even for free if we disregard the cost of labour and energy used to prepare the firewood.

Completely different findings are evident with pellets, where the price has risen significantly, especially in 2006, which is also seen in a wide price range of pellets in Slovene regions. The reasons for this can be found in different times of purchase and the incapability of wood fuel preparation. The latter was significantly used by the big pellet merchants, who consensually raised the prices due to a lack of competition and for a short time pushed the owners of pellet boilers into a corner.

A significant difference in prices is not seen with forest chips because the set prices are still a result of a very personal, co-dependent and locally conditioned relationship between the buyer and the merchant and mainly a locally represented form and manner of heating.

### 6.3 Sale

#### 6.3 Prodaja

To enable a satisfactory or even an improved sale, we first need to explore the existing connection between the manufacturer and the consumer. If an organisation or an individual wish to define their distributing policy, they initially need to know their existing possibilities available to them. At the same time one needs to know and evaluate the answers to the questions, which affect the distribution of the product.

1. Which are the decisions that must be made at the store level?
2. What are the needs for storage facilities at certain locations?
3. What is the form of transport to the warehouses, agents or directly to the customer?
4. What are the measures we need to take in the case of "force majeure"?

It is evident in Table 9 that the average of the four year studies one's own forest still represents a key source of wood fuel in more than half of the questioned households,

**Table 9:** Fuel source for heating system in questioned households per individual years

**Preglednica 9:** Viri kuriva za kurilno napravo v anketiranih gospodinjstvih po posameznih letih

Year Leto	Own forest Lasten gozd	Foreign forest Tuj gozd	Unorganized market Neorganiziran trg	Supplier-Dealer Dobavitelj-Trgovec	Salamon. oglas.	Others Drugo
2003	70.5%	3.3%	14.8%	4.9%	0.0%	6.6%
2004	63.5%	8.1%	16.2%	10.8%	0.0%	0.0%
2005	54.8%	8.3%	16.7%	19.0%	0.0%	1.2%
2006	44.2%	6.9%	14.7%	31.2%	1.2%	1.4%
TOGETHER / SKUPAJ	51.2%	6.9%	15.2%	23.9%	0.7%	1.8%

despite the fact that the share is significantly decreasing due to suppliers and pellet merchants.

It is still characteristic of the Slovene wood fuel trade that in 74.3% the costs of transport and delivery are the responsibility of the households; in 22.8%, the price of wood biomass already includes these costs, a small share (2.5%) of transport and delivery costs of wood biomass are paid separately. The latter speaks in favour of the important self-mobilizing capability of households to arrange the transport and delivery of the heating fuel themselves.

With the segment of sales research (Table 10), when considering the possibilities of questioned households offering personally attained wood biomass on the market, we reached the conclusion that as many as 52.9% of households could offer forest chips on the market. A smaller share of the households (31.1%) is capable of offering additional quantities of chunkwood. This fact proves that the segment of forest chips and chunkwood still offers a lot of unexplored options and market possibilities.

The current relationship regarding wood fuel partially explains the fact that the supply of this source never presented any bigger problems, at least not on a higher scale. It is a fact that the supply of firewood in the "grey" and "black" markets has always been conducted undisturbed, even in periods of the largest deficiency of other energy sources.

## 6.4 Promotion

### 6.4 Promocija

Studies for the purpose of planning promotional activities are necessary in market operations considering that substantial funds are spent in this field. The studies for the purpose of promotional activities are mainly focused on specific aspects with the aim of gaining answers to the following questions:

1. What is the cost of promotion regarding the region and form of the promotion?
2. What are the specific characteristics and benefits we need to stress in the promotion?
3. What is the best combination of existing media for our product?
4. How successful were promotional campaigns in the past regarding the consumer?

In the segment of research of promotional activities, we initially identified the key sources of the first information on financial support for purchasing a heating system in the questioned households (Table 11) and discovered a significant role of fitters and sales people (27.4%) and friends and acquaintances (26.4%) when receiving the first information. The latter is an eloquent proof of the fact that more than half of the first information on financial support for the purchase of wood biomass boiler is transferred orally.

The general estimate of the information source and information on possibilities and conditions of

**Table 10:** Possibilities of questioned households to supply own acquired wood biomass to the market

**Preglednica 10:** Možnosti ponudbe lastno pridobljene lesne biomase anketiranih gospodinjstev na trg

Wood biomass <i>Lesna biomasa</i>	We could <i>Bi lahko</i>	We can't <i>Ne moremo</i>	We wouldn't <i>Ne bi</i>	We don't produce WB <i>LB ne pridobivamo</i>
Chunkwood / <i>Polena</i>	31.1%	23.2%	25.9%	19.6%
Pellets / <i>Peleti</i>	0.0%	4.7%	1.6%	93.8%
Forest chips / <i>Sekanci</i>	52.9%	17.1%	17.1%	11.4%
TOGETHER / <i>SKUPAJ</i>	26.7%	18.2%	19.3%	35.4%

**Table 11:** First information source of financial support for purchasing heating system per individual wood biomass type in questioned households

**Preglednica 11:** Vir prve informacije o finančni vzpodbudi za nakup kurilne naprave v anketiranih gospodinjstvih po vrstah lesne biomase

Wood biomass <i>Lesna biomasa</i>	Printed media <i>Tiskani mediji</i>	Web page <i>Spletna stran</i>	TV or radio TV <i>ali radio</i>	Brochure <i>Prospekt</i>	Friend–Acquaintance <i>Prijatelj–Znanec</i>	Don't know <i>Ne vem</i>	Expert <i>Strokovnjak</i>	Fitter–Salesman <i>Inštalater–Prodajalec</i>
Chunkwood <i>Polena</i>	17.4%	9.3%	1.9%	6.3%	28.9%	0.5%	8.2%	27.5%
Pellets <i>Peleti</i>	18.0%	17.2%	3.9%	4.7%	22.7%	0.8%	9.4%	23.4%
Forest chips <i>Sekanci</i>	24.3%	7.1%	2.9%	5.7%	20.0%	1.4%	4.3%	34.3%
TOGETHER <i>SKUPAJ</i>	18.4%	10.8%	2.5%	5.8%	26.4%	0.7%	8.0%	27.4%

wood biomass use among the questioned households is, according to our study, considered suitable in as much as 75%, as very suitable in over 10%, as unsuitable in 11% and as unavailable in 3.5% of the households.

Table 12 gives us a unique insight into the visibility and activity of the organisations in the field of wood biomass use where the households chose the Sector for Activities of Efficient Use and Renewable Energy Sources (AEUE) and Slovenia Forest Service (SFS). The latter is the most recognisable with its vast network of district foresters if we exclude AEUE as the organization giving the financial supports. The Energy Restructuring Agency, Chamber of Agriculture and Forestry of Slovenia (FFCS), Slovenian Forestry Institute (SFI) and the Global Environmental Fund (GEF) play only a smaller role.

**Table 12:** Most recognisable and active organizations in wood biomass use per years among questioned households

**Preglednica 12:** Najbolj prepoznavne in dejavne organizacije na področju rabe lesne biomase med anketiranimi gospodinjstvi po letih

Year Leto	SFS ZGS	ERA APE	AEUE AURE	SFI GIS	FFCS KGZS	GEF
2003	62.3%	13.1%	45.9%	9.8%	11.5%	11.5%
2004	43.2%	12.2%	67.6%	1.4%	14.9%	8.1%
2005	50.0%	13.1%	59.5%	2.4%	17.9%	2.4%
2006	39.3%	13.6%	66.5%	7.5%	11.0%	6.1%
TOGETHER SKUPAJ	43.9%	13.3%	63.4%	6.2%	12.6%	6.4%

We can use the data in Table 13 to assess the success of promotional activities and to determine the use of financial support. It is clearly evident that the change to wood biomass heating is the most extensive with heating oil.

**Table 13:** Ways of heating in questioned households prior to purchasing new heating system

**Preglednica 13:** Načini ogrevanja v anketiranih gospodinjstvih pred nakupom nove kurilne naprave

	Natural gas Plin	Heating oil Kurilno olje	Coal Premog	Wood biomass Lesna biomasa	Electricity Elektrika	WBDH DOLB
Shares Deleži	4.6%	47.6%	5.0%	63.7%	3.7%	0.7%

It is therefore necessary to place special attention to the search and promotion of our circumstances and the state of a suitable technology of preparation and use of wood fuel, so that we can choose a combination of media, which can reach the segment of the households with the lowest possible cost.

## 6.5 Control

### 6.5 Kontrola

When conducting market research, we must not forget the control, which will enable us to get an insight into the results of the previous work. And so the following questions need to be answered in order to achieve the set sales goals.

1. What is the existent sale and share of our product in the common market and in specific geographical areas? The important segments of our customers?
2. Are we covering all the markets and geographical regions in accordance with our expectations?
3. What do the existing and potential consumers or distributors think of us?
4. How is our product accepted? Is the plan to launch the product being realized?

Table 14 gives us a good insight into the product shares in the common market and it places chunkwood at the top, followed by pellets and forest chips.

**Table 14:** Shares of individual wood biomass type in returned questionnaires in percentage

**Preglednica 14:** Deleži kuriv oziroma posamezne vrste lesne biomase v vrnjenih anketnih vprašalnikih vzorca, izraženi v %

Wood biomass Lesna biomasa	Y./L. 2003	Y./L. 2004	Y./L. 2005	Y./L. 2006	TOGETHER SKUPAJ
Chunkwood Polena	72.1%	56.8%	72.6%	63.6%	65.0%
Pellets Peleti	6.6%	9.5%	14.3%	30.3%	22.7%
Forest chips Sekanci	21.3%	33.8%	13.1%	6.1%	12.4%

In order to succeed in the market, we of course need to determine important segments of our customers, at least regarding the average age (Table 15), age (Table 16), education (Table 17) and status structure of the reference persons (Table 18).

**Table 15:** Reference individual's (main decision holder) average age in questioned households, which affects the choice of heating system per individual wood biomass type

**Preglednica 15:** Povprečna starost referenčne osebe v anketiranih gospodinjstvih oziroma glavnega nosilca odločitve za izbiro kurilne naprave po vrstah lesne biomase

	Chunkwood Polena	Pellets Peleti	Forest chips Sekanci	TOGETHER SKUPAJ
TOGETHER SKUPAJ	44 years / let	43 years / let	44 years / let	44 years / let

**Table 16:** Reference individuals' age structure in questioned households per chosen age groups

**Preglednica 16:** Starostna struktura referenčnih oseb oziroma glavnega nosilca odločitve za izbiro kurilne naprave na LB v gospodinjstvih po izbranih starostnih razredih

	<=30 years let	31-50 years let	51-70 years let	>70 years let	TOGETHER SKUPAJ
Number Število	55	368	136	6	565
Shares Deleži	9.7%	65.1%	24.1%	1.1%	

As far as planning future promotional activities is concerned, the attention needs to be directed mainly towards people of the age group between 31 and 50 years, with a secondary school education and the status of an active inhabitant, since these people represent the major part of wood biomass users in the questioned households.

**Table 17:** Reference individuals' educational structure

**Preglednica 17:** Izobrazbena struktura referenčnih oseb oziroma glavnega nosilca odločitve za izbiro kurilne naprave na lesno biomaso

	Without primary school Brez OŠ	Primary school Osnovna šola	Secondary school Srednja šola	University Viš. - Visoka izobrazba	Sum Skupaj
Number Število	8	43	345	169	565

**Table 18:** Reference individuals' status structure in households per individual wood biomass type

**Preglednica 18:** Statusna struktura referenčnih oseb gospodinjstev po vrstah lesne biomase

Wood biomass Lesna biomasa	Active inhabitant Aktiven preb.	Unemployed Brezposelen	Pensioner Upokojenec	Others Drugo
Chunkwood Polena	86.6%	1.4%	10.6%	1.4%
Pellets Peleti	84.4%	1.6%	12.5%	1.6%
Forest chips Sekanci	82.9%	0.0%	11.4%	5.7%
TOGETHER SKUPAJ	85.7%	1.2%	11.2%	1.9%

**Table 19:** Structure of forest area (in hectares) per individual wood area groups of those questioned households, which acquire wood biomass from own woods

**Preglednica 19:** Struktura površine gozda (v ha) po posameznih razredih tistih gospodinjstev, ki lesno biomaso pridobivajo iz lastnega gozda

	<=1 hectare ha	>1 - 5 hectare ha	>5 - 10 hectare ha	>10 - 30 hectare ha	>30 - 100 hectare ha	>100 hectare ha	SKUPAJ TOGETHER
Shares / Deleži	5.2%	39.6%	24.0%	25.3%	5.6%	0.3%	100.0%
Number / Število	15	114	69	73	16	1	288

Due to different demands, needs and environmental issues, people with university education or higher education and pensioners represent an important segment of wood biomass users.

With decisions at the sale we cannot ignore the structure of wood area groups of those questioned households, which acquire wood biomass from their own woods (Table 19), since the latter is of key importance, at least with chunkwood, when determining and measuring the market segment.

The structure of forest area tells us that most households, which acquire wood biomass from their own forests, own a forest area of 1 to 5 hectares. The average Slovene privately owned forest property of 2.65 ha can also be found within this interval (MEDVED 2003).

As part of the control segment, we were also interested in the consumers' opinion. Our study shows that expert help, counselling and designing the new heating system was described as suitable by 60.5% of the questioned households, as very suitable by 16.1%, as not suitable by 11.3%, as not available by 4.4%, and as not necessary by 7.6% of the questioned households.

We also established that the heating system completely met the questioned households' expectations in most of the cases (79.3%), but did so only partially in 19.3% of the cases. 1.4% of the questioned households said that the heating system did not meet their expectations. The latter is mainly due to a deficient maintenance service and resolving warranty claims by the company Ferrotherm.

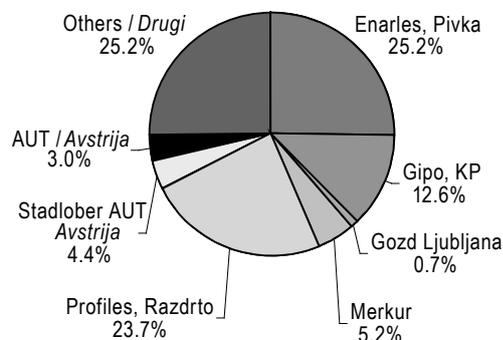
We obtained slightly worse results when determining the current offer of the wood biomass suppliers in the questioned households (Table 20). The participants namely rated the offer as unorganized (25.1%) and even as not suitable in 13.8%.

**Table 20:** Wood biomass current supply evaluation in questioned households

**Preglednica 20:** Ocena trenutne ponudbe dobaviteljev lesne biomase v anketiranih gospodinjstvih

	Unorgani-zed Neorganizirana	Not suitable Nepriprerna	Suitable Priprerna	Very suitable Zelo priprerna	Not necessary Nepotrebna
Shares Deleži	25.1%	13.8%	55.9%	2.7%	2.3%

In the final stages of the study, we contacted the most frequent pellet suppliers or merchants in the questioned households (Figure 2) and established that the acceptability of the pellets among the consumers is the highest in the company Enerles in Pivka and Profiles in Razdrto.



**Figure 2:** Most frequent pellets suppliers in questioned households

*Slika 2: Najpogostejši dobavitelji oziroma trgovci pelet v anketiranih gospodinjstvih*

Figure 2 clearly shows that Slovene pellet manufacturers represent 48.9% of the market share, followed by Slovene suppliers and shopping centres with 18.5%, and that the smallest share of 4.7% is attributed to manufacturers and suppliers from the neighbouring Austria.

## 7 Conclusions

### 7 Zaključki

The biggest potential in wood fuel trade in Slovenia represent the households where we have limited data and estimation (SURS 2006) on the total use of wood biomass, and this is true despite the fact that the households use almost 40% of all roundwood from the forest (KRAJNC, N. / PIŠKUR, M. 2006).

Free trade of wood biomass and an enlarged number of buyers consequently set a gradual forming of an information system regarding supply and demand. Both the providers as well as the customers need to be informed as to the possibilities of purchase or sale. We cannot expect that individual providers and customers will successfully monitor the changes in wood fuel trade on their own.

The research into wood fuel trade is gaining new dimensions. Because forestry is a long-term production activity, global marketing presents a very important factor, i.e. monitoring global market movement and its tendencies. The operating level of market research must therefore serve direct business decisions and enable adaptations to conjectural movements in the market.

When researching the wood fuel trade with the recipients of financial support for the purchase of wood

biomass boilers, which was aimed at satisfying existent and potential consumers of wood biomass, we reached the following conclusions:

1. We discovered an almost 7.5-times increase in the number of new pellet boilers and an almost 3-times increase in the number of new chunkwood boilers with the questioned households in individual apartment houses in Slovenia. The latter is indicative of a steeply increasing trend in the use of wood biomass.
2. As one of the three studied types of fuel in wood fuel market, chunkwood holds the dominant position (65%), followed by pellets (22.7%) and forest chips (12.4%). All three types of wood biomass have a positive and rapidly increasing trend of use. Also an insight into the position of wood biomass for the whole of Slovenia reveals that wood biomass is emerging as the only heating source with the questioned households. These findings indirectly indicate good future development possibilities in wood fuel trade in Slovenia.
3. With just under 95% participants we estimate that the trend of wood biomass use will increase in the future.
4. The questioned households stated in 52.6% the increase in the cost of other rival energy sources in the last research year (2006) as the key reason for the decision for wood biomass heating. The switch to wood biomass heating was the most extensive with heating oil.
5. The average power of pellet heating systems is 24 kW, 25 kW with chunkwood and 46 kW with forest chips. The average duration of a heating season is within the interval of 6.2 and 6.5 months. The average size of a heated living area in analysed households is expressed in m<sup>2</sup> and it amounts to a surprising surface of 198 m<sup>2</sup>.
6. The estimated use of individual type of wood biomass per m<sup>2</sup> of heated living area amounts to: 0.1 prm/m<sup>2</sup> for chunkwood, 0.22 m<sup>3</sup>/m<sup>2</sup> for forest chips and 29.34 kg per m<sup>2</sup> of a heated living area in the heating season.
7. The price of pellets has risen considerably, especially in 2006. We can find the reasons in different time of pellet purchase and a consensual price rise of the pellets by the merchants or manufacturers. No significant price rise was noted with chunkwood and forest chips, since the process of determining prices is still a very personal, co-dependent and locally conditioned relationship between the customer and the provider and a more common form of heating in the suburban and rural areas.
8. The four-year study of the average shows that an own forest is still the key source of firewood in more than half of the questioned households. As many as 37.8% of the questioned households use beech chunkwood

as firewood.

9. When considering the possibility of offering wood biomass attained by the questioned households themselves on the market, we reached a conclusion that as many as 52.9% of households could offer forest chips and 31.1% of households are capable of offering additional quantities of chunkwood. And so there is a lot of unexplored options and market possibilities in the segment of forest chips and chunkwood sale.
10. The key source of information regarding the first information on financial support for the purchase of a heating system in the questioned households represent the fitters and sales personnel (27.4%), and friends and acquaintances (26.4%). More than half of the first information on financial support is transferred from mouth to mouth.
11. A general estimate of the information sources and information on possibilities and conditions of wood biomass use is considered as suitable in 75% of all questioned households.
12. The most recognisable and active organisation in the field of wood biomass use is the Slovenia Forest Service, if we exclude the AEUE as the organization giving the financial supports. The Energy Restructuring Agency, Chamber of Agriculture and Forestry of Slovenia (FFCS), Slovenian Forestry Institute (SFI) and the Global Environmental Fund (GEF) play only a smaller role according to the closed questionnaire.
13. The average age of the reference person in the questioned households or the main decision holder for the choice of wood biomass heating system is 44 years. More than 65% of the reference persons are found in the group between 31 and 50 years, 61% of all the participants finished secondary school. The active residents in our study are represented as a vast majority with 85.7%, with retired people representing 11.2%.
14. Expert assistance, counselling and design of the new heating system was rated as suitable in 60.5% of the questioned households, as very suitable in 16.1%, as not suitable in 11.3%, not available in 4.4%, and even as not necessary in 7.6%. We established that the heating systems fully met the questioned households' expectations in most of the cases (79.3%).
15. The vast majority of the questioned households, which gain wood biomass from their own forest, own a forest surface between 1 and 2 ha (39.6%). 49.3% of the households own a forest ranging from 5 ha to 30 ha.
16. The current offer of the wood biomass suppliers has been rated as unorganized in 25.1% of the questioned households and even as not suitable in 13.8%.

17. The acceptability of the pellets among the questioned households is the highest in the company Enerles in Pivka and Profiles in Razdrto.

## 8 Summary

In the survey of wood fuel trade among individual residential premises in Slovenia, we devoted our attention to market management oriented to the existent as well as potential consumers' satisfaction. Problems are solved by marketing-mix elements: product, price, place and promotion.

Consumers' needs are attained by the above mentioned marketing-mix methods: product making and product development, a widely acceptable price, well organized sale and satisfactory promotion. 909 households took part in the questionnaire; they are the financial support recipients for boiler purchasing from 2003 to 2006, and these households are our survey data source. 565 closed questionnaires, which contained 22 questions each, have been returned by mail and these questionnaires represent our survey pattern.

The survey at more levels shows that the vast majority of households included in the questionnaire are in favour of wider wood biomass use in Slovenia. A big increase in new chunkwood and pellets boilers in 2006 also confirms this statement.

Price increase of other competitive sources of energy has become the key reason for individual households' decision to embark on wood biomass heating. Switch over to wood biomass heating concerns mainly fuel oil.

The survey also states average power of wood biomass heating systems (pellets 24 kW, chunkwood 25 kW, forest chips 46 kW), average duration of the heating season (6.3 months), average size of heated residential area (198 m<sup>2</sup>), and individual type of wood biomass consumption per m<sup>2</sup> of heated residential area (chunkwood 0.1 prn/m<sup>2</sup>, forest chips 0.22 m<sup>3</sup>/m<sup>2</sup>, pellets 29.34 kg/m<sup>2</sup>).

Since chunkwood can be bought off the market at considerably lower prices or even free of charge if we prepare firewood ourselves, we had some problems in price assessment as the number of people who purchase chunkwood from wood fuel trade is extremely low. There is no evident price deviation in forest chips, since prices in this segment are determined by buyer-seller relationship and above all by locally spread form and ways of heating. Pellets price has increased rapidly in 2006, which is also visible in pellets price range in Slovenian regions (from 0.20 to 0.26 EUR/kg).

Own woods still represent the most important heating source in households that took part in the questionnaire. In 37.8% of the households, chunkwood beech tree prevails. In wood fuel trade, chunkwood prevails (65%), then pellets with 22.7%. while forest chips are last with

12.4%. These data clearly indicate that there are numerous market opportunities hidden in the segment of sale of additional quantities of own forest chips and chunkwood. Most households, which get wood biomass from their own forests, have forests ranging from 1 to 5 hectares in size (39.6%). There are 49.3% households, whose forest size ranges from 5 to 30 hectares.

In the promotion segment, the survey has established that more than a half of first information on financial support for boiler purchasing is transferred verbally. General estimation on data source about wood biomass use possibilities and conditions among households is considered suitable in 75% cases. The Slovene Forest Service is considered to be the most noticeable and active organization in the segment of wood biomass use.

When estimating how satisfied the consumers are with professional help, advise giving and projecting a new heating system, it was found to be suitable in 60.5% cases. In 79.3% cases, the heating system has fulfilled all expectations. Current supply of wood biomass has been estimated as unorganized in 25.1% cases, as inappropriate in 13.8% cases. We also attempted to establish the dominating pellet suppliers, and found out these are Enerles from Pivka and Profiles from Razdrto.

When determining our buyers' important segments we also took into consideration the average age as well as reference individuals' age, education and status structure.

## 9 Povzetek

Pri raziskavi trga lesne biomase med gospodinjstvi individualnih stanovanjskih hiš v Sloveniji se posvečamo tržnemu poslovanju (marketingu), ki je usmerjeno v zadovoljevanje obstoječih in potencialnih potrošnikov. Probleme rešujemo z elementi "marketing-mixa" (Product, Price, Place in Promotion).

Zadovoljevanje potreb potrošnika dosežemo s prej omenjeno kombinacijo "marketing-mixa": z ustvarjanjem in razvojem proizvoda, ceno, ki bo sprejemljiva čim širšemu krogu uporabnikov, z dobro organizirano prodajo in ob pomoči zadovoljive promocije.

Izvor podatkov raziskave predstavlja 909 anketiranih prejemnikov finančnih vzpodbud za nakup kotla na lesno biomaso v letih od 2003 do vključno 2006. Vzorec raziskovanja predstavlja 565 vrnjenih zaprtih anketnih vprašalnikov z 22 vprašanji, ki smo jih pošiljali po pošti.

Raziskava na več ravneh ugotavlja, da so anketiranci v veliki večini naklonjeni širši rabi lesne biomase v Sloveniji. Na slednje kaže tudi zelo velik skok števila novih kotlov na pelete in polena v letu 2006.

Rast cen drugih konkurenčnih energentov je v letu 2006 postal ključni razlog pri odločitvi za ogrevanje na lesno biomaso posameznega gospodinjstva. Prehajanje na ogrevanje z lesno biomaso je največje pri kurilnem olju.

Raziskava ugotavlja tudi povprečno moč kurilnih naprav na lesno biomaso (peleti 24 kW, polena 25 kW, sekanci 46 kW), povprečno dolžino ogrevalne sezone (6,3 meseca), povprečno velikost ogrevane stanovanjske površine (198 m<sup>2</sup>) ter porabo posamezne vrste lesne biomase na m<sup>2</sup> ogrevane stanovanjske površine (0,1 prm/m<sup>2</sup> za polena, 0,22 m<sup>3</sup>/m<sup>2</sup> za sekance in 29,34 kg/m<sup>2</sup> za pelete).

Ker je polena mogoče kupiti mimo trga po občutno nižjih cenah, kot so na tržišču, dobiti pa jih je možno tudi zastonj, če si drva izdelamo sami, smo imeli v segmentu ugotavljanja cene polen težave, ker je število ljudi, ki so odvisni od nakupa polen na trgu lesne biomase, izjemno majhno. Pri sekancih o večji razliki med cenami ne moremo govoriti, saj gre pri določevanju cen v tem primeru še vedno za osebni in soodvisen odnos med kupcem in prodajalcem ter predvsem za lokalno zastopano obliko in način ogrevanja. Pri peletih je cena predvsem v letu 2006 močno poskočila, na kar kaže tudi velik razpon cene pelet (od 0.20 do 0.26 EUR/kg) po slovenskih regijah.

Lasten gozd je še vedno najpomembnejši vir goriva v anketiranih gospodinjstvih. Bukev je v 37,8 % gospodinjstev, ki se ogrevajo na polena, prevladujoča drevesna vrsta. Polena imajo tudi sicer prevladujoč položaj (65 %) na trgu lesne biomase, sledijo peleti (22,7 %) in sekanci z 12,4 % deležem. Tudi zato je v segmentu prodaje dodatnih količin lastnih sekancev in polen gospodinjstev skritih še veliko tržnih priložnosti. Največ anketiranih gospodinjstev, ki lesno biomaso pridobivajo iz lastnega gozda, ima gozd v razredu od 1 do 5 ha (39,6 %). V razponu od 5 ha do 30 ha pa najdemo 49,3 % gospodinjstev.

V segmentu promocije raziskava ugotavlja, da se več kot polovico prvih informacij o finančni vzpodbudi za nakup kotla na lesno biomaso prenaša s promocijo od ust do ust. Splošna ocena virov podatkov in informacij o možnostih in pogojih rabe lesne biomase med anketiranimi gospodinjstvi velja za primerno v 3/4 primerov. Za najbolj prepoznavno in dejavno organizacijo na področju rabe lesne biomase so anketiranci izbrali Zavod za gozdove Slovenije.

Pri ugotavljanju zadovoljstva potrošnikov s strokovno pomočjo, svetovanjem ter projektiranjem nove kurilne naprave ugotavljamo, da je v 60,5 % primerna in da je kurilna naprava pri 79,3 % anketiranih upravičila vsa pričakovanja. Trenutno ponudbo dobaviteljev lesne biomase so anketiranci ocenili kot neorganizirano kar v 25,1 %, v 13,8 % pa celo kot neprimerno. Pogledali smo tudi najpogostejše dobavitelje oziroma trgovce pelet ter ugotovili, da je sprejetost med potrošniki največja pri podjetju Enerles iz Pivke in podjetju Profiles iz Razdrtega.

Pri določanju segmentov naših kupcev ugotavljamo še povprečno starost, starostno strukturo in izobrazbeno strukturo ter statusno strukturo referenčnih oseb.

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