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# RECYCLING ASSESSMENT

*-for-*

## SOUTH-CENTRAL SERBIA

2009



## A STRATEGIC DOCUMENT

*-for-*

### PUBLIC, PRIVATE & CIVIL SOCIETY ACTORS

RELEASED: OCTOBER 2009



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**Financing:** This assessment was self-financed by Treehouse, Krusevac

## Acronyms & Definitions

### Terms & Acronyms

**Collector:** As used in this report, an individual or public or private company that collects recyclables, and who may provide further processing such as sorting, washing and/or producing an intermediate such as granulated or shredded plastic.

**CRDA:** Community Revitalization through Democratic Action, a \$200 million USAID project implemented throughout Serbia by five partners working in five geographic regions.

**RSD:** Republic of Serbia dinar, at the time of this writing: €1.00 = \$1.46 = 93.7 RSD.

**DOO:** Društvo s Ograničenom Odgovornošću, or LLC (Limited Liability Company).

**JKP:** Javno Komunalno Preduzeće (Public Communal Enterprise); public or publicly-funded enterprise in Serbia working at the municipal or regional level responsible for city and municipal maintenance, including waste collection.

**LED:** Local Economic Development, a development strategy that facilitates public, private and civil society partners working together improve economic conditions.

**MSME Development:** Micro, Small and Medium Enterprise Development, a set of development strategies that seek to strengthen existing and startup enterprises so they operate more efficiently and are better able to grow.

**PPI:** Producer Price Index; measures average change over time in the selling prices received by domestic producers for their output; in the US PPIs are collected and reported by the US Bureau of Labor Statistics; PPIs are aggregated and reported for virtually all industrial materials and sectors, including all recyclables.

**REAP:** Recycling & Employment Alternatives Program; program implemented by Mercy Corps in southern Serbia under the USAID CRDA project; program invested in 23 municipal and private-sector collectors and recyclers in 2007.

**Recycler:** As used in this report, a company that is producing a consumer product from recycled materials.

**SZR:** Samostalna zanatska radnja, a business registration for a type of sole proprietorship “workshop” business.

**USAID:** United States Agency for International Development, US Government agency providing economic and humanitarian assistance worldwide.

### Plastics

**HDPE:** High Density Polyethylene; a hard, opaque form of PE with a higher melting temperature; commonly used for beverage cases; also used for cell liners in sanitary landfills; recycling symbol number “2.”

**LDPE:** Low Density Polyethylene; commonly used for plastic bags and six-pack soda can rings; recycling symbol number “4.”

**LLDPE:** Linear Low Density Polyethylene, a linear-molecular form of PE that is advantageous because of it allows lower thicknesses; commonly used for stretch wrap and thin plastic bags.

**PE:** Polyethylene; most widely used plastic, with annual production of 80 million tons; primarily used for packaging materials, including shopping bags; see descriptions for specific types of PE;

**PET:** Polyethylene terephthalate; a rugged, lightweight plastic that serves as excellent liquid and gas barrier; commonly used for beverage containers; Mylar is a thin-film PET; recycling symbol number “1.”

**PP:** Polypropylene; a rugged plastic, unusually resistant to most chemicals; commonly used for beverage and food container caps (such as PET bottles), as well as most “living hinges” (such as on Tic-Tac containers) due to its fatigue-resistance; recycling symbol number “5.”

**PS:** Polystyrene; commonly used for disposable cutlery and CD cases; foamed polystyrene (Styrofoam) is common material used for coffee cups, insulation and packing peanuts; recycling symbol number “6.”

**PVC:** Polyvinyl chloride; third most widely used thermoplastic polymer after PE and PP; commonly used in construction applications as building materials that are cheap, durable and easy to assemble; typically not recycled due to prohibitive processing costs.

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**REDUCE:** *Use less, waste less, and buy products that contain less packaging through:*

- **Source Reduction:** *Reduce waste before buying it and purchase products that are not wasteful in their packaging or use.*
- **Conservation:** *Reduce waste through wise use of natural resources.*
- **Precycling:** *Purchase products in recyclable packaging.*

**REUSE:** *Reuse materials in their original form instead of throwing them away or give them to others who could use them.*

**RECYCLE:** *Separate reusable materials and bring them to recycling centers so they can be remade into the same product or new products. Recycling consumes less energy and resources than producing from new materials.*

**COMPOST:** *Compost organic and food waste to produce a useful by-product and to conserve landfill space.*

## Summary

**Serbia Waste Management Situation:** The state of waste management and recycling in Serbia is far below EU targets. Only about 60% of municipal solid waste is collected in Serbia, and less than 10% recycled. From 180 registered landfills, only one meets the required sanitary standards. However the recycling sector, yet young in Serbia, displays a fairly vibrant level of activity, especially in the private sector. Collectors and small-scale recyclers operate in many municipalities; recycled consumer goods are being successfully marketed; and actors are networked and cooperative. Public recycling programs are being managed in some municipalities, all of which show potential for improvement in volume, outreach and efficiency. While collection of most recyclables remains low, there appears to be additional demand for recyclables, showing that there exists potential for growth and outreach.

**Assessment Overview:** This assessment examines the recycling sector in order to inform relevant actors in the Serbian Government and international donor community about the sector and potential areas for intervention and support. The assessment includes eight municipal collection and 13 private sector collectors and recyclers in 11 municipalities. It covers plastic, paper and glass; metal, which is recycled fairly efficiently in Serbia, is not included.

**Plastic:** The term “plastic” is broad and it should be noted that the marketability and values of different types of recycled plastic vary widely. Some plastics have higher values and are reprocessed locally into new consumer products by a number of Serbian recyclers; PET on the other hand is typically collected, pressed, baled and consolidated where it ultimately ends up at one of two large plastic processors in Serbia where it is subsequently exported. The price for plastics mirrors that for petroleum. The international financial crisis and the drop in petroleum prices adversely affected many recyclers as the price for virgin material dropped to levels near those for recycled plastic.

**Paper:** Paper includes all types of paper and cardboard; cardboard in particular has value and is recycled in varying levels of efficiency in most cities. Roma collect much of the communal paper waste, and other private and individual collectors collect industrial cardboard waste. The waste paper is consolidated by regional buyers in towns and cities, where it is ultimately resold to Umka.

**Glass:** There are limited opportunities for glass collection and recycling in Serbia; the sole glass factory in Paracin reportedly does not recycle. One Krusevac recycler buys *unbroken* glass containers and then sells them through a network of users and other traders.

**Municipal Collection Initiatives:** Eight municipalities/JKPs were interviewed in this assessment; all had received a USAID donation to start or expand a recycling program. Of the eight, only four currently manage a recycling program: two started and later stopped; and two have yet to utilize their donations. Municipalities typically focus on plastic (PET) collection, and to a lesser degree on paper and cardboard; none collect glass. Municipalities typically collect less than 1 ton/month of plastic, far lower than a comparable private sector collector in Trstenik who operates similarly. Factors that determine success of a municipal program include geography, will and initiative of actors, citizen behavior, media outreach, container design, and politics. None of the municipalities surveyed are covering the expenses incurred as a result of recycling. Despite apparent opportunities for mutually beneficial public-private partnerships, no good examples were observed in the survey. Facilitating such partnerships would seem an excellent initiative for development actors.

**Private Sector Initiatives:** Thirteen private sector “collectors” and “recyclers” are included in this assessment; the small scale plastic recyclers typically process less than 10 tons/month, compared with the large collector and processor Brzan Plast, which processes more than 400 tons/month. When comparing public and private sector collection initiatives, it is evident that the private sectors are earning income whereas the municipal initiatives generally do not indicating that gains in efficiency should be possible with the municipal programs. Much of the private recycling sector is characterized by trade between the actors, indicating a fairly strong functional network of actors. A Serbian Recycling Association has been formed and registered and has been involved in a few initiatives. As one might expect, Roma are often involved in recycling, particularly on the side of collection and small-scale consolidation. Despite a host of challenges in the sector, private recyclers can operate profitably and there are a number of opportunities in what should be a growth sector.

**Development Opportunities:** Recycling is an excellent area for development support from donors and the national Government. In addition to the environmental and social benefits, the issue should be addressed through a number of development strategies: local governance and LED, MSME development, minority inclusion and job creation, and technical service provision. On a macro level, there is need for further examination of the sector on a national scale, along with large-scale planning and organization that will ultimately result in efficient and effective recycling and waste reduction programs across the country. Donor strategies are outlined in more detail in the section devoted to this issue.

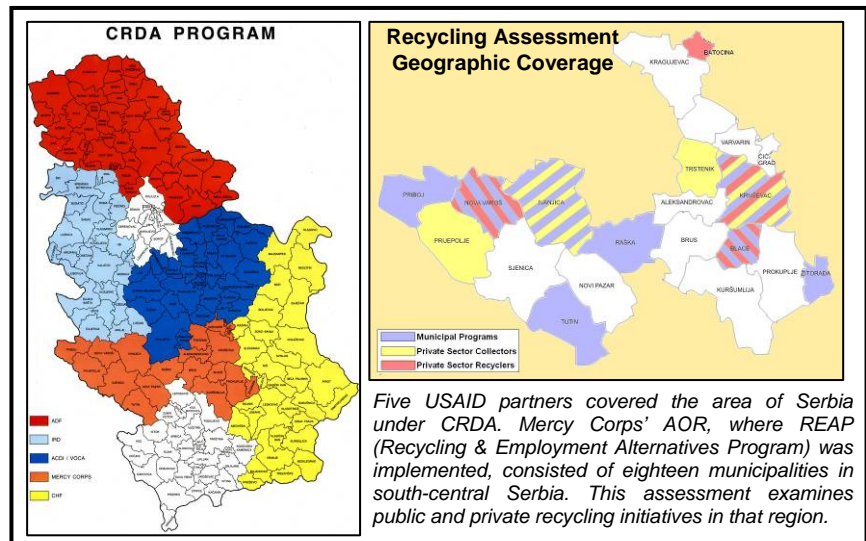


## Introduction

### Assessment Overview

**Goal & Objectives:** The goal of this assessment is to examine the recycling sector and inform relevant actors in the Serbian Government and international donor community about the workings of the sector and potential areas for intervention and support. In addition, this assessment sets out to accomplish a number of other objectives:

- feed back information to actors in the recycling sector;
- create a database of collectors and recyclers that can be used to strengthen the network and organize activities in the recycling sector;
- provide an opportunity for the Treehouse NGO and our staff members to better understand the Serbian recycling sector, enabling our organization to become a resource in the field;
- conduct a follow-on assessment of clients receiving assistance under the USAID-funded Recycling & Employment Alternatives Program (REAP), an initiative under the Community Revitalization through Democratic Assistance (CRDA) project.



**Geography:** The geography of this assessment was selected for two main reasons. First, Treehouse is a Krusevac-based NGO and our familiarity with the region and actors facilitated locating and interviewing the actors. Secondly, the region and many of the actors interviewed were part of the REAP initiative; this report also provides an impact assessment of donations made under REAP. Some of the municipalities in this region are also among the more underdeveloped regions in Serbia; therefore, one can reasonably expect an even higher level of recycling activity in other parts of Serbia than that observed here.

### Recycling & Employment Alternatives Program (REAP):

The REAP initiative provided opportunities for local governments, communal enterprises and businesses to apply for capital investments that supported recycling activities in an economically viable way and created new jobs. REAP was implemented in thirteen municipalities in south-central Serbia (see table) providing capital investments to 10 municipal collection programs and 13 private sector recyclers. The average investment per project (excluding trainings and study tour) was \$17,100 plus an average matching contribution of \$6,300. International Finance Corporation (IFC) of the World Bank provided training and consulting services to the clients. Nineteen of the 23 REAP clients were interviewed in this assessment.

REAP Project Results				
Type	Projects	CRDA-E	Match	Jobs Created
Municipal Collection	10	\$163,000	\$56,000	37
Plastic Processing	4	\$86,000	\$48,000	15
Wood Scrap & Waste	7	\$100,000	\$29,000	21
Mixed Products	2	\$43,000	\$12,000	10
Training & Study Tour	2	\$3,000	---	---
<b>Total:</b>	<b>25</b>	<b>\$395,000</b>	<b>\$145,000</b>	<b>83</b>

REAP invested nearly \$400,000 in collection, processing and recycling initiatives in 13 municipalities. The IFC Recycling Linkages program provided training and consulting services to complement the USAID financial resources. In total 64 applicants applied for REAP, of which 23 (36%) were financed. The program created 83 new full-time jobs, 16 which were filled by Roma, resulting in a sum of \$4,760 in donor cost per job.

**Methodology:** All interviews conducted for this assessment were made on-site, generally at the interviewer's facility or office, with the exception of one, Raska JKP, which was a telephone interview. In that case, however, the city of Raska was visited and its recycling containers were surveyed. Eight of the ten municipal collection projects financed by REAP were interviewed; 11 of 13 private enterprises were interviewed, though six of these were in the wood sector and are not included in this assessment. Interviews were conducted in a systematic fashion and included these topics: overview of program or business, supply and collection issues, markets and demand, finances, REAP impact, sector challenges and opportunities, and macro issues such as legislation and donor assistance.

## Recyclable Materials & Prices

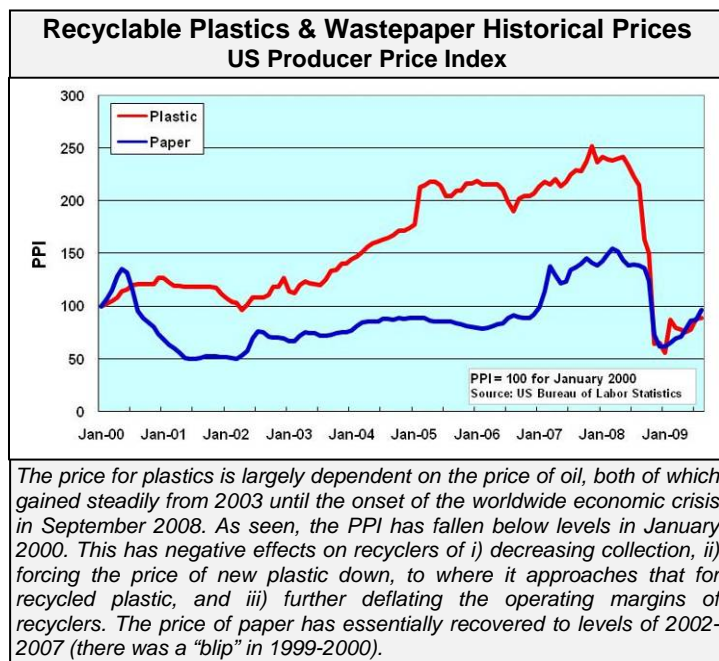
**Materials:** This assessment focuses primarily on three general materials: plastic, paper and glass, though emphasis is placed in plastics. Six wood waste recyclers were interviewed but are not included in this report.

**Plastic:** It is a simplification to group all plastics together since their recyclability, markets and values vary depending on the material (see Acronyms & Definitions). LDPE plastic folio and hard plastics of the type used in beer cases and fruit trays, plus other plastics like polypropylene are recycled in Serbia by a number of small-scale producers of consumer plastic goods. No appreciable quantities of PET, if any, are recycled in Serbia; rather they are consolidated, baled or shredded, then ultimately sold to a large collector in Romania for sale to international markets, mainly China. Addressing PET waste is important due to its sheer volume and generally negative environmental impact. Though PET can be recycled, it is more difficult and generally feasible only on a large scale; its value is low, local markets are essentially nonexistent, and its use is widespread and growing (see chart). As a result, it is one of the most visible, and unfortunately enduring, forms of litter.

International Plastic Prices September 2009	
Plastic Material	Price (€/ton)
PET	€840
HDPE	€960
LDPE	€1,140
LLDPE	€1,050
PS	€1,130
PP	€1,210

*This chart shows average prices for various plastics on the international market in September 2009. PET is among the lowest-price plastics, accounting for its lower recycling rate and difficulty that recycling programs have in recovering costs. Other plastics have higher values and can be recycled locally in Serbia, increasing their demand.*

Source: IDES – The Plastic Web

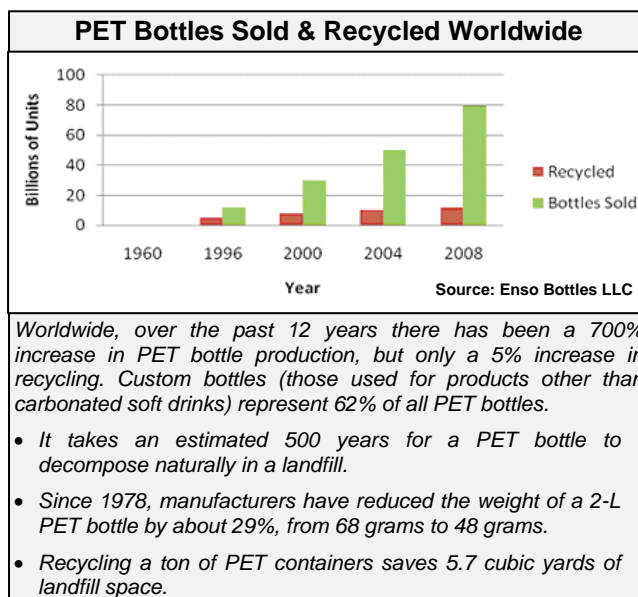


recycler, Kalimero Komerc, buys any type of *unbroken* glass jar or bottle. Through their network of clients the company is able to trade or sell virtually any glass container. The company has contacts with similar companies in other parts of Serbia, indicating that glass recycling is possible. Expanding this network and helping it to function more efficiently could be an opportunity for development projects.

**Historical Prices:** The accompanying graph shows the Producer Price Index (US) for plastics and wastepaper since January 2000 (= 100). The upward trend for plastics mirrors the international price trend of petroleum (not shown in the chart). In September 2008, with the onset of the international financial crisis, the price of plastics fell dramatically where it currently resides below levels of January 2000. This has adversely affected recycling as many collectors have stopped collecting since the effort is not worth the income. Recyclers suffer as a result, and

**Paper:** Paper as defined in this assessment includes all types of paper and cardboard. In general, communal waste paper (mainly cardboard) has value as a recyclable and is collected in varying levels of efficiency in most cities in Serbia. In many cases, Roma collect cardboard waste from nearby shops and other trash containers, consolidate it through small local buyers (also often Roma) who in turn sell it to larger private sector city or regional buyers, where it is ultimately resold to Umka, the Belgrade-based paper company.

**Glass:** There are very limited opportunities for glass collection and recycling in Serbia. The only glass factory, in Paracin, by all accounts does not buy recycled glass. Though numerous municipalities initially placed recycling containers for glass, it was quickly discontinued when they learned there was no market. One Krusevac



also face further lowering of operating margins and increased competition from lower-cost new plastics. Note that these figures are for US producers; for plastics at least, figures should closely mirror international trends.

## Policy

**Waste Management Situation:** The Government of Sweden, in a study of the environmental situation in Serbia, summarizes the situation: “The general state of waste management, waste recycling and safe waste handling in Serbia is poor, reducing public health and causing environmental hazards. Only about 60% of municipal solid waste is collected in Serbia (around 2.2 million tons per year). The most acute problem regards hazardous waste (e.g. electronic appliances, chemicals), which is not separately collected but dumped without pretreatment on regular waste dumps. The industrial waste has increased from 68,000 tons in 1999 to 176,000 tons in 2006. There are no treatment plants or disposal sites for hazardous waste. Waste disposal sites generally do not meet the technical requirements of sanitary landfills. There are hundreds of illegal dumpsites in rural areas. The construction of regional sanitary landfills and the rehabilitation of the existing ones are among the priorities of the Ministry of Environment.”

### Waste Management in Serbia Facts & Figures

- *Population of Serbia: 7.5 million, 58% of which reside in urban areas.*
- *Estimated per capita waste generation: 290 kg/person/year.*
- *Households generate about 63% of the municipal waste, businesses about 20%.*
- *About 60-70% of municipal solid waste (2.2 million tons annually) is collected.*
- *Solid waste is typically collected only in urban areas.*
- *There is no organized waste collection and treatment in rural areas.*
- *Landfills (dumps) are the primary means of waste disposal.*
- *Municipal waste, including hazardous waste generated by households, is usually disposed directly in landfills.*
- *From approximately 180 registered landfills for municipal waste, only one meets the required standards.*

*Source: Republic of Serbia  
Ministry of Environment & Spatial Planning.*

**Serbia National Waste Management Strategy:** The Serbia National Waste Management Strategy adopted in 2003 establishes the following fundamental principles of waste management: i) local management of waste at the point of generation; ii) minimization and prevention of waste; iii) separate collection of waste materials; iv) neutralization of hazardous wastes; and v) regional approach to waste disposal and rehabilitation of existing disposal and dump sites. In addition, the strategy proposes the formation of 29 Waste Management Regions, each with an environmental and economically sustainable waste management system.

**Serbia Law on Waste Management:** The Government of Serbia's Law on Waste Management (2008) defines the following:

- complete harmonization of national legislature with EU requests through approaching EU legislature;
- efficient legislature implementation, as a matter of priority, and reaching a high level of harmonization;
- demarcation of competences (division of functions and responsibilities among the republic, province and local levels of decision-making);
- adequate capacities of institutions responsible for waste management;
- adequate human resources and capacities for waste management (public and private sector); and
- inclusion of the private sector into management of municipal solid waste.

Goals & Deadlines of the Strategies of the EU Member-States in Harmony with the Directives (table not shown in entirety)		
Waste Type	Request	Year
Communal Waste	Volume Limit – not more than 300 kg/inhabitant/year	2010
Biodegradable Waste deposited in landfill	Reduction to 75 %	2010
	Reduction to 50 %	2013
	Reduction to 35 %	2020
Package Waste	Reuse of min. 50%	2007
	Recycling of min. 25%	2010

## Other Information

**About Treehouse:** Treehouse is a Serbian NGO working to improve the environment in Serbia by completing environmental improvement initiatives and studying environmental issues to assist informed and intelligent decision-making. Treehouse is located in Krusevac and was established in 2009 by former staff members of the Mercy Corps Community Revitalization through Democratic Action (CRDA) project, a \$40 million USAID-funded project implemented in 18 municipalities in south-central Serbia. This assessment was self-financed by Treehouse.

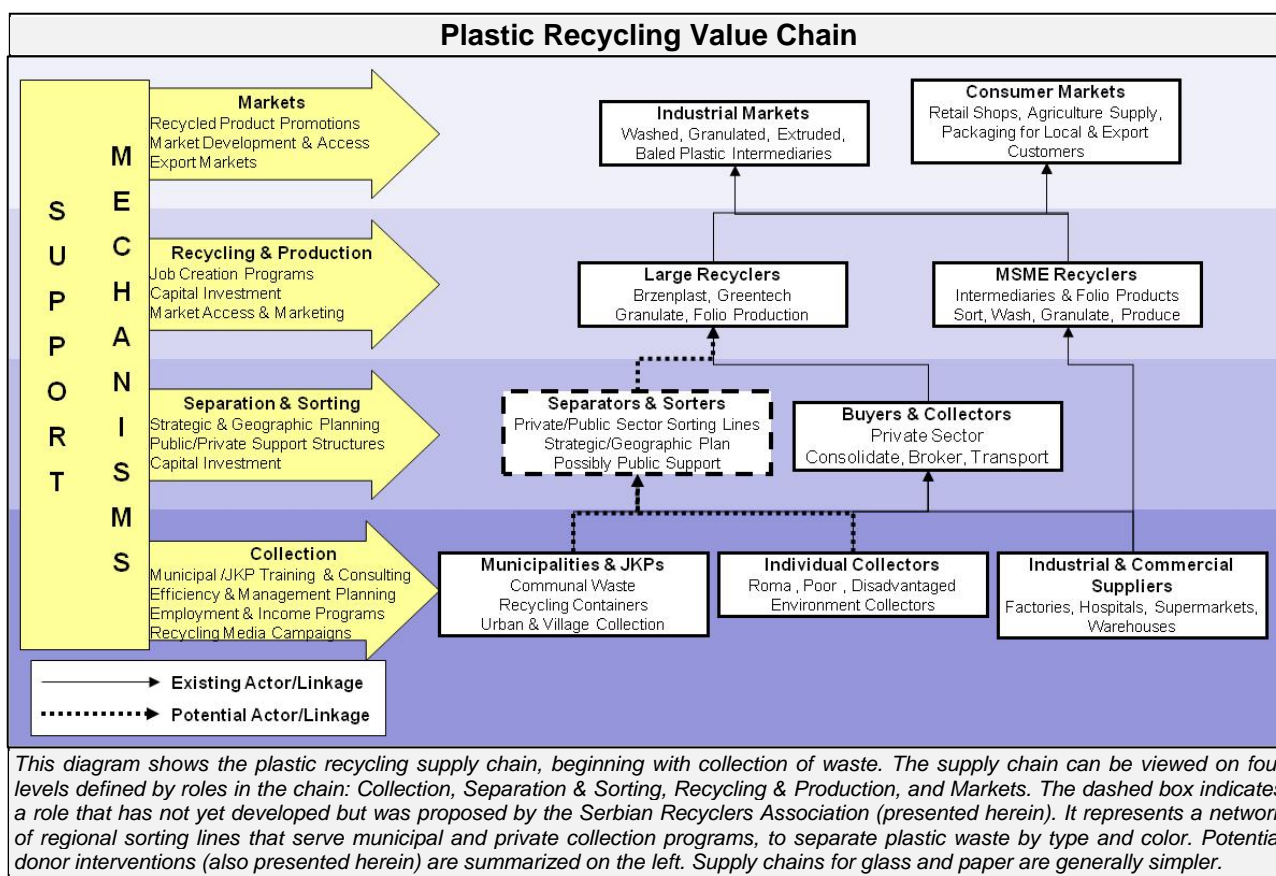
**Currency Conversion:** Some data used in this report were adapted from international sources. For reference, the relevant currency exchange rates at the time of this writing, September 21, 2009, are €1.00 = \$1.46 = 93.7 RSD.



## Results & Findings

**Overview:** This section presents the results and observations concluded as a result of this assessment. The reader is referred to the Enterprise & Municipal Profiles section of this assessment, which includes much more specific data and information on each collector and recycler surveyed. This section presents municipal collection programs, private sector collectors, and then private sector recyclers (producers of consumer products from recycled materials).

**Recycling in Serbia:** The recycling sector, young in Serbia, has a fairly vibrant level of activity, especially in the private sector; more importantly, a number of indicators show that there is potential to build and expand on current initiatives. Private sector collectors specializing in specific materials are operating in many municipalities; small-scale producers of recycled consumer and industrial products are working; and the actors are generally networked and cooperative through informal business relationships. While collection of most recyclables remains at fairly low levels, buyers and recyclers state that there is additional demand for materials. Public communal recycling programs are being managed in numerous municipalities, most of which show potential for improvement in volume, outreach and efficiency.



**Recycling Value Chain:** The recycling value chain for plastic is presented in the diagram. Individual diagrams could be developed for specific types of plastic, but this diagram suffices to illustrate the general organization of the sector. At the bottom of the diagram are the collectors, consisting of municipal programs, individual collectors and industrial and commercial suppliers. The next level involves the separation, sorting and washing of plastic, and may include some value-adding steps such as cutting or grinding. At the third level reside the manufacturers and producers of consumer and industrial products for sale to markets. Finally, industrial and consumer markets are identified, ultimately those actors that determine the demand for recycled materials.

### Municipal Initiatives

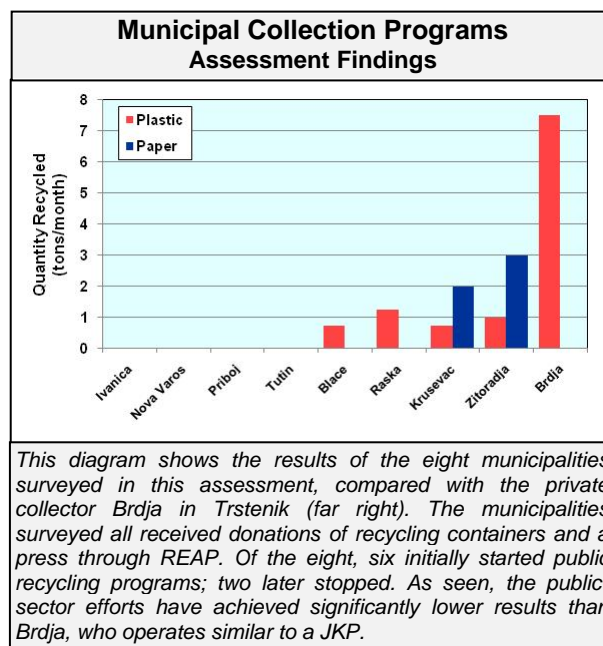
**Municipal Collection Programs:** Eight municipalities/JKPs were interviewed in this assessment; all had received a USAID donation to start or expand (in the case of Krusevac) a recycling program. Of the eight, only four currently manage a recycling program; two reportedly started and discontinued their efforts (Ivanica and Priboj); and two never utilized their donations (Nova Varos and Tutin). Municipalities typically focus on plastic (PET) collection, and to a lesser extent on paper and cardboard; none of the municipalities surveyed collects glass. The chart shows the average monthly



collection of plastic among the eight municipalities surveyed (the private communal collector Brdja is shown for comparison).

**Results Discussion:** Geography, will and initiative, citizen behavior, and politics are some of the key factors involved in the success of municipal recycling programs. Of the eight municipalities that received REAP donations to start a recycling program, only four started and continue their programs to the present. Some of the keys to a successful program include:

- **Geography:** Geography plays a role in recycling success as remote municipalities face more difficulties in identifying buyers, transportation and recycling economics. Expanding around existing “hubs” or clusters of recycling programs, and establishing and supporting regional sorting lines, may help to overcome this challenge.
- **Will & Initiative:** The will and initiative of municipalities and JKPs ultimately determines the success of a public recycling program. The actors must be diligent in introducing and promoting the initiative to the public, persistent in their efforts despite potential early setbacks, and committed to achieving their goal and targets.
- **Citizen Behavior:** Citizen behavior can largely be influenced by an effective media campaign to introduce recycling, encourage citizens to recycle, engage the private sector, and provide ongoing information about the program to the public. Media coverage can also help eliminate wrong impressions and opinions among the public; for example, it is common for average citizens to state that they believe that the JKPs are not recycling the collected waste but rather pressing it and sending it to the landfill along with the rest of the communal waste.
- **Politics:** The relations and cooperation between the municipalities and JKPs vary widely between municipalities. It might be generalized that smaller municipalities have better cooperation than larger ones; larger municipalities may have an opposition party in charge of the JKP, further complicating the issue. Regardless, the politics of the relation play a key role in recycling success, as recycling can clearly impact current waste management contracts and agreements between the municipality and JKP.



National Recycling Program Plan (Presented by Brzan Plast & Serbian Recycling Association)	
Collection	
Serbia Population	7,500,000
Containers (1 container/1000 citizens)	7,500 containers
Collection per Container	150 kg/month
Total Collection Serbia	1,125 tons/month
Sorting	
Sorting Lines (1 line/100,000 citizens)	75 sorting lines
Sorted PET per Month	15,000 kg/month/line
Expense Summary	
Pickup & Transport to Sorting Line	38.9 M RSD/year
Sorting & Pressing	247.5 M RSD/year
Transport to Recycling Center	45.0 M RSD/year
Total Expenses (annual)	381.4 M RSD/year
Cost Analysis	
Cost per kg PET	24.5 RSD/kg
Cost per Citizen	44.2 RSD/kg
Recycled Quantity per Citizen	1.8 kg/citizen (roughly 47 2-L bottles)
Cost per Bottle (26 2-L bottles/kg)	0.94 RSD/bottle
<i>These data summarize a logistical and cost analysis to meet EU recycling goals in Serbia through national collection and a network of sorting lines. The figures present a logical and workable solution, including taxation estimates to finance the entire plan. The effort should be accompanied by a recycling media campaign and government support at national and local levels. The proposal was developed by Brzan Plast and the Serbian Recycling Association and can serve as a basis for further estimation and refinement; key assumptions are noted.</i>	

**Plastic Collection:** Municipal recycling programs, typically managed by Public Communal Enterprises (JKPs), generally focus on collection of plastic, and to a lesser extent paper and cardboard. Since there are virtually no private collectors of PET plastic bottles, JKPs often collect PET with the main goal of reducing the trash to landfills rather than doing so as a source of income. Though they do sell their collected PET and other plastic (to Greentech, Brzan Plast or an intermediary) it is generally done at a loss when considering all expenses associated with collection.

**Paper Collection:** Some JKPs also collect paper and cardboard, though since this commodity has more value, they are often in “competition” with private collectors (mainly Roma). While some JKPs view this as a problem, others such as Zitradia view it positively as it is being recycled regardless, as well as providing income for unemployed Roma. Blace JKP sells the small amount of paper and cardboard it collects to a Roma firm in Prokuplje, one example of a positive public-private partnership.

**Glass Collection:** Glass is a unique challenge to all municipal recycling programs; none of the municipal

programs surveyed are collecting glass. The sole Serbian glass producer, in Paracin, does not recycle. However, with a limited number of glass collectors (e.g. Kalimero Commerce in Krusevac) glass recycling presents an excellent opportunity for a good public-private partnership.

**Public-Private Partnerships:** Despite what might be described as glaring opportunities, there are few examples of positive public-private partnerships in recycling activities in the region, with the exception of the sale of municipal recyclables to the large private firms Greentech and Brzan Plast (not exactly partnerships). Most often, private recyclers cite failed attempts at public-private partnerships, perceived obstruction by the municipality or JKP, or in the best case simply a lack of interference in allowing them to operate. Several businesses cited attempts to place communal recycling containers, collect from landfills, or other form of partnership, all of which were rejected by public officials or made unprofitable due to fees proposed by the JKPs. While JKPs didn't counter these arguments directly, many of them express frustration if, for example, paper and cardboard are removed from JKP containers by Roma collectors. What makes the matter confounding is that while many JKPs are not in favor of recycling because of the additional costs they incur, neither are they seemingly in favor of allowing private businesses and individuals to do it. Facilitating such partnerships would seem an ideal initiative for international donors and partners, an initiative with concrete, quantitative, and easy-to-measure indicators.

**Recycling Program Finances:** All municipalities/JKPs surveyed indicated that recycling programs are more expensive to manage than revenues generated, but that reduced landfill demand is also a benefit to consider. The reader is, however, referred to Brdja in Trstenik, a company that serves the role of JKP through communal collection, but does so on a profit basis with no local government subsidy or assistance. The Brdja example illustrates that it should be possible for municipal programs to generate revenues sufficient to at least offset expenses. Brdja succeeds by collecting communal waste in public containers in addition to purchasing recyclable materials from private collectors (none of the JKPs interviewed have this practice). Brdja also attributes their success to better separation by their workers than by public employees, as well as to general private sector efficiencies not achievable in the public sector.

**Citizen Separation:** In a separate assessment Treehouse conducted a formal, systematic survey of recycling container use over a two-month period in Krusevac, as well as a spot inspection of containers in the cities surveyed in this assessment. Our findings include a number of general observations:

- Separation of plastic recyclables is often better in smaller cities and even villages than in many locations in urban centers. This runs counter to what might be expected, though some interviewees explained that it may be because waste disposal problems are more evident in villages, due to the high number of very visible illegal landfills.

### **Municipal Recycling**

#### **Steps to Establish a Public Program**

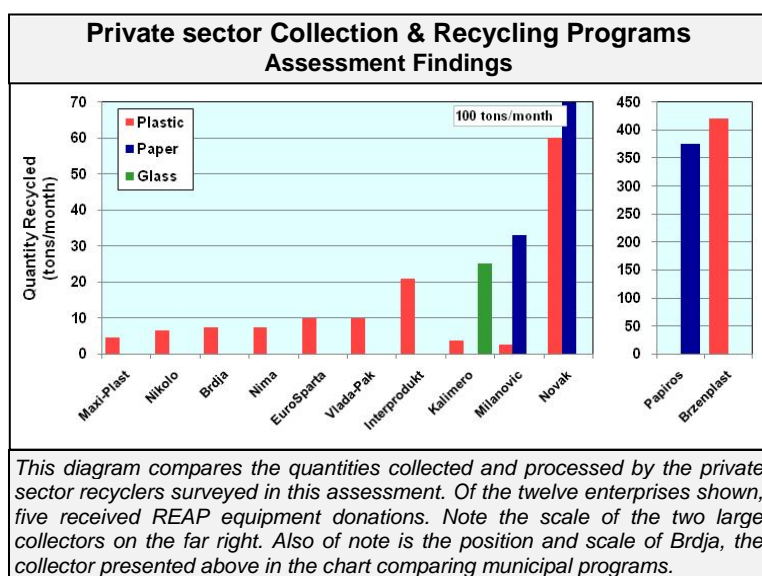
1. Make the commitment to start.
2. Decide materials to be collected based on a simple market assessment of buyers and financial estimates.
3. Plan to target plastic. Identify and contact potential buyers to learn terms, conditions and opportunities in the area.
4. Identify local private sector actors to procure recyclables when possible. Investigate partnerships and separate agreements for different materials.
5. Determine how much value-adding will be done by JKP and the public sector in general. If separation and processing cannot be counted on to be thorough (as is generally the case) this role should probably be left to the private sector, with JKP simply pressing and baling. This obviously affects the economics.
6. Negotiate agreements between municipalities, JKPs and/or contracted private sector recyclers. Include incentives for specific targets or quantities.
7. Estimate number of containers for starting. A rule-of-thumb is approximately one container per 1000 citizens.
8. Review container designs and select a design and size that can be managed by the collection vehicles. The see-through wire containers have better citizen separation than the closed-lid varieties.
9. Conduct a public relations campaign focusing on regional media outlets, advertising and school campaigns.
10. Conduct a public relations campaign at the onset of the program. Place containers in parks, bus stations and other high visibility areas; near schools; and near high concentrations of residences such as apartment complexes. In housing areas, containers can be placed at intersections with high pedestrian traffic to allow all citizens the opportunity to recycle with a minimum of effort. Avoid placing containers in places where there are no general use containers.
11. Outline a "route" to simplify container pickup; place containers along the route.
12. Determine if recycling program will buy or accept individual or private-sector collection. If so, ensure that collectors are aware of the terms, locations and conditions.
13. Communicate and negotiate with private sector collectors to realize larger economies of scale for sale and transportation to the large buyers.
14. Try to avoid a common public perception that the collected recyclables are being disposed of rather than recycled by publicizing results.
15. Task collectors to monitor the rate at which containers in specific areas are filled. Move or add containers as necessary to try to balance the time so that containers fill at roughly the same rate.
16. Review these issues on a periodic basis to make improvements and expand outreach.

*Treehouse developed this list of key steps and considerations municipalities and JKPs should examine when starting a municipal recycling program. A useful donor-financed activity would be to further develop this list, creating a guidebook with a list of private sector contacts, public-private partnership models, and providing training and seminars in target municipalities to facilitate the startup of recycling programs.*

- Wire recycling containers (those whose contents can be viewed from outside) have better separation than those of the closed-lid variety (with fitted holes or slots to accept the proper waste). It is clearly better for citizens to see the contents of recycling container, and perhaps may also reassure citizens that the JKP is in fact recycling the separated waste and not simply sending it to the landfill (a common perception, at least in Krusevac).
- Recycling containers should be accompanied by general waste containers nearby. Recycling containers alone attract general waste, as citizens simply dispose of their waste in the most convenient container. Interestingly, many plastic recycling containers in the small towns and villages in Blace and Zitoradja had excellent separation despite not being placed near general trash containers.
- Recycling containers should be efficiently placed to maximize collection and minimize collection efforts. Containers should be placed on an easily-traversed route; placed and numbered to fill at roughly the same rate (meeting the numbers and demands of citizens in the neighborhood); placed to allow all citizens the *opportunity* to recycle with minimal effort; and placed in public areas of high visibility, areas with high residential populations and foot traffic, and areas with high drink consumption.

## Private Sector Collectors & Recyclers

**Collectors vs. Recyclers:** For the purposes of this assessment, a distinction is made between collectors and recyclers. Though the line is sometimes blurred, the term “collector” is used to describe a company that is limited to collecting, sorting, washing and/or producing an intermediate such as granulated or shredded plastic that is then resold. “Recycler” is used to describe a company that is producing a consumer product from recycled materials. It should be noted that most recyclers are also in the business of collection, so the distinction is sometimes subtle, as both collectors and recyclers can be considered as value-adders. This section summarizes the private sector in general – both collectors and recyclers, while in the Municipal & Company Profiles section, the profiles are organized separately. In this section except where specifically noted, for simplification purposes, the term “recycler” is used to mean both.



**Public vs. Private Sector:** When comparing public and private sector recycling efforts, one might ask why public collection efforts (JKPs) lose money while private collectors doing very similar work make money. The direct answer to this question likely involves issues such as public-sector inefficiencies, private sector's ability to target specific waste and exclude other waste, and better diligence on the part of the private sector in ensuring that recyclables are properly sorted, cleaned and packed for buyers. In general, while municipalities and JKPs state that they “lose money” through recycling, they have not developed public-private partnerships that would both reduce their own costs and broaden recycling outreach. As discussed elsewhere in this assessment there are ample opportunities for a variety of public-private partnerships.

**Challenges:** Waste collection and recycling is difficult and dirty work; recyclers face numerous challenges, including:

- recycled materials offer low operating margins;
- economies of scale (and therefore capital investment) are required to succeed given the low operating margins;
- private companies are at an inherent disadvantage compared to JKPs, which receive public subsidies for their recycling efforts, and have shown little interest in public-private partnerships;
- the work itself is dirty and difficult;
- the initial sorting process is labor intensive (it is typically done by means of a conveyor with a number of individuals manually separating plastic by type and color);
- few people have an interest in working with waste and if they're not employed directly, they are often unreliable;
- laborers and collectors are generally unskilled and often uneducated;

- those who do work in the sector are often disadvantaged and face their own challenges.

**Recycling Opportunities:** Despite these challenges, there are ways for private recyclers to operate profitably. In fact, some recyclers say that it is because of some challenges that they are able to succeed. For example, the undesirable nature of waste management means that few entrepreneurs have the interest, thereby allowing opportunities in the market for those who are willing. Nikolo, a plastic recycler in Krusevac, says that one of the keys to being successful is minimizing and maintaining low monthly fixed expenses. He added that unless a company can afford expensive, automatic sorting equipment they are going to require a larger workforce.

**Non-Monetary Trade:** Private sector collection and recycling is characterized by an inordinate level of commodity trade between the actors. Such trade has allowed these actors to develop a kind of functional network amongst themselves that in many cases allow them to:

- trade raw material for finished plastic goods or other materials,
- plan their production so as not to compete with each other by producing similar products,
- combine commodities and shipments to jointly fill larger orders, and
- broker deals where one company “sells” a commodity to a user without actually having to handling it directly.

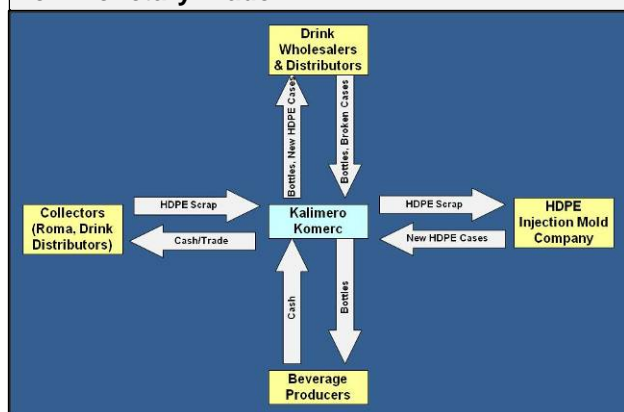
### Profile – Vlada-Pak, Blace Plastic Recycling

*Vlada-Pak in Blace trades his final products and excess raw material to a similar business in Vrnjacka Banja for their final products and raw materials. Both businesses operate small shops where they sell each others' consumer products, mostly inexpensive plastic household items. Due to the low margins on their products, they plan their production to be complementary rather than competitive.*

*Vlada-Pak is also a good example of a business that can be considered both a collector and recycler. Vlada-Pak buys virtually any plastic material (including PET bottles, which are pressed and baled after removing caps) then produces intermediaries and consumer products with the higher value plastics.*

*Though many recycling businesses use such terms as “closed-loop” or “zero-waste” when describing themselves, firms operating like Vlada-Pak are likely the closest example.*

### Profile: Kalimero Komerc, Krusevac Non-Monetary Trade



*This diagram exhibits the role of trade in typical company transactions for the company Kalimero Komerc in Krusevac. The company buys and collects glass containers and HDPE beverage cases, and through their network supplies the markets and users for the materials. In addition, the company often brokers deals in cooperation with other similar collectors.*

**Collection Opportunities:** Though most collectors specialize in one or several materials, they tend to be opportunistic and will sometimes buy, trade or broker deals in materials outside of their particular specialty. They may do this on a one-time basis, for example if they locate a large supply of a particular plastic waste; or they may change their focus as prices of different materials change, adjusting their collection to meet demand. Some collectors may buy almost any material if they have a potential buyer, though they typically stay limited to a range of materials due to their established distribution networks and sector knowledge. One example of this observed at Kalimero Komerc in Krusevac, who at the time of our interview was sending samples from two tons of plastic waste to a potential buyer in the hopes of brokering a deal for the sale.

**Large Recyclers (Plastic):** There are two large plastic recyclers in Serbia: Greentech near Novi Sad and Brzan Plast in Batocina, near Kragujevac. These large recycling plants purchase most types of plastic, then sort, wash and

process the plastic into intermediaries and final products. Brzan Plast was interviewed as part of this assessment. Regarding PET, most or all of the baled plastic in Serbia eventually ends up at one of the two facilities, where it is reportedly transported to a large processor in Romania, and ultimately exported around the world (China is the largest recipient).

**Social Consciousness:** One of the more interesting observations made during this assessment was an apparent social consciousness of most of the private sector actors. In fact, nearly all of the private recyclers practice some sort of social action, for example periodically or regularly collecting plastic from rivers, cleaning illegal landfills, serving as advocates for public-private partnerships and environmental legislation, and providing plant tours for school children. Even those who do not complete these acts seem to have a degree of socially-minded perspective and insight on their work, the environment and their role in the community. (This is not to glamorize the position; because of the nature of their work, and likely their backgrounds, recyclers stereotypically tend to be working-class-type individuals.)

**Minorities/Roma:** As one would expect the collection of consumer recyclables in many municipalities relies largely on the Roma population; where there are few Roma living, the job is sometimes taken up by other disadvantaged



individuals. In some cases, as is often the case with metal recyclers in many villages and cities in Serbia, collection is managed almost entirely by the Roma. Paper and cardboard waste is also often conducted by the Roma, and in some cases the major municipal buyers are also Roma. With regard to plastics, Roma collection is generally limited to hard plastic such as HDPE drink cases. In Krusevac, all collectors know Kalimero Komerc for buying glass and hard plastics, so they are served by a broad network of Roma collectors.

**Glass:** Kalimero Komerc in Krusevac is a small collector that concentrates on glass and HDPE. The company is one of only a few companies in Serbia that collects and recycles glass. The company buys virtually any glass bottle or jar (so long as they are not broken), then washes, packs and sorts them by type and size, selling them to a host of users. Kalimero has been unsuccessful in attempts to cooperate with the local government or JKP, despite several efforts. One challenge facing Kalimero is low public awareness of his business for citizens who might wish to recycle or who have large stores of glass containers.

**Challenges:** According to recyclers, the main constraint they face is not directly related to recycling, but one faced by MSMEs throughout Serbia – delayed or failure on the part of clients to make their payments. Most businesses surveyed indicated that the worst cases are generally those involving larger enterprises or retail chains. An example noted by one firm involved an outstanding payment owed to them, the debtor in turn was owed money by a large and well-known Serbian company. This large company offered to pay the debt to either in the form of retail products, which was refused by both. The large company finally agreed to pay the original firm the amount owed, but charged a 3% administrative fee; essentially paying themselves an administrative cost for paying their own debt.

## Development Opportunities

**Overview:** The recycling sector is an excellent area for international donor (and national government) support. In addition to the environmental and social benefits of conservation and recycling, the issue can be addressed via a number of development avenues; cross-cutting themes such as education and media campaigns play a key role in all of the development programming areas outlined below:

- strategic and logistical planning for the sector, leading to a national framework to logically cover the territory of Serbia with collection, sorting and recycling;
- job creation and income generation, both in terms of actual employment as well as income generation for individual collectors;
- local governance (and LED) programming, addressing the issue at the municipal level to facilitate startup and outreach of municipal recycling programs;
- MSME development activities, such as training, networking and direct investment, to support the private sector;
- minority and disadvantaged development, targeting particularly Roma and other marginalized groups that are already active in recycling;
- technical service provision, to facilitate networking and increase the knowledge, information and technical capacity of recyclers.

**Development Goal:** Though the methodologies, partners and actors in development programs will vary, all should share a similar goal to reduce waste. A common indicator, one that should be fairly easily and accurately measured, is the change (increase presumably) in quantities recycled. Most of the actors interviewed in this assessment, both public and private, already track this indicator in some way in their current records. The point is that if some of these recommendations are ultimately implemented, they are done in such a way that the overall goal of reducing waste remains a primary goal.

**Sector Planning & Organization:** Perhaps first and foremost, a *national* assessment should be conducted to expand the findings of this assessment and to develop a view of the entire sector throughout Serbia. The assessment should

### Partnerships

#### Public, Private & Civil Society Sectors

*Recycling presents a host of opportunities to develop and improve partnerships between the public, private and civil society sectors. As a start, municipalities should open discussions with private sector actors to explore mutually beneficial interests.*

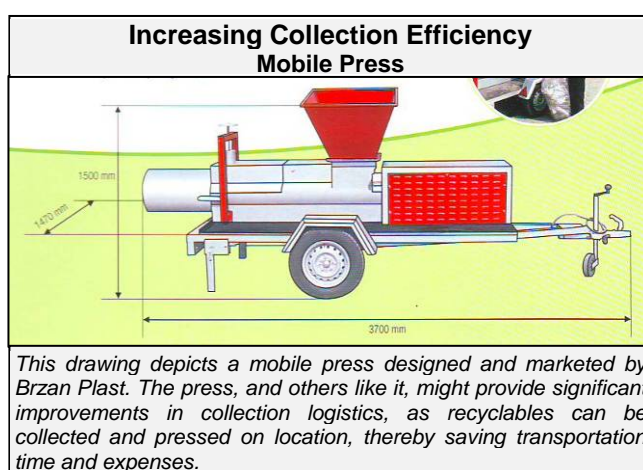
- *Municipalities: Re-examine, strengthen and enforce agreements with JKPs.*
- *Municipalities: Sign agreements with private sector collectors for certain materials. Agreements can be based on payments to the municipality for its waste, subsidies or outsource contracts to the private collector, or some other fee structure.*
- *Municipalities: Facilitate individual private collectors, such as Roma, by providing separate containers for materials such as cardboard that are then collected by the individual collectors. In other words, help the individual collectors to become more efficient so that they can collect higher quantities.*
- *Municipalities: Use their budgets, with ecology and economic development funds, to provide support and stimuli to private sector recyclers.*
- *JKPs: Sign agreements with private sector collectors to collect recyclable waste from municipal landfills and illegal dumps. Fee structures would be negotiated.*
- *Municipalities and private sector actors: Engage civil society and the media to provide youth and citizen education, manage media campaigns, and provide community outreach to support recycling programs.*

include current municipal recycling initiatives in order to establish a baseline and identify centers or clusters that might serve as outreach hubs. Corollary to this is to begin a process of involving experts and relevant partners in developing a strategy that will ultimately result in recycling (and waste reduction) programs in all municipalities in Serbia. The groundwork of previous initiatives such as the National Recycling Program Plan (presented above) can be built upon and refined to develop a national strategy that all partners can ultimately work toward, one addressing such issues as the role of Serbia in Europe, policy and Government strategy for outreach to municipalities, EU trade and neighboring country partnerships, logistical alternatives to create a country-wide supply chain network, market development, and a financial strategy that includes alternatives such as container taxes or deposit fees. The key stakeholders for such an initiative are Ministry of Environment and other relevant ministries, medium and large-scale collectors and recyclers, the Serbian Recycling Association, national NGOs, and donors and financiers.

**Job Creation & Income Generation:** Unemployment estimates in some Serbian municipalities surpass 30%; therefore, it is no wonder that municipal recycling programs have often not been a priority, as municipal authorities and citizens rarely view recycling as a means to create jobs and raise incomes. However, jobs can be created and income raised through recycling initiatives. In addition to those directly employed with processing firms and municipal collection, recycling can create a source of revenue for collectors, including many Roma. The REAP program shows that jobs can be created for less than \$5000. Donors can help this effort through initiatives that facilitate and expand collection, help the sector to function more effectively and for collectors to perform their role more efficiently, and support collection incentives for public and private sector actors.

#### **Local Governance & Local Economic Development**

**(LED):** Recycling is an excellent intervention point for LED programs as it involves all of the principles that LED and local governance programs promote: local government response to constituencies, public enterprise efficiency and cost-effectiveness, and public-private partnerships. Recycling programs necessarily mandate relations between local governments and JKPs, and provides both sides with opportunities to evaluate the role of JKPs versus private sector outsourcing. A useful development tool along these lines would be a guidebook and training that covers relevant steps, principles and analysis for municipalities and JKPs to successfully implement recycling programs. Its content can expand on the “Steps to Establish a Public Program” outlined above, and be introduced through planning workshops and follow-on consulting. Key partners in this area include local government officials, JKPs, and regional private sector collectors and recyclers.



**Enterprise Development:** Numerous donors in Serbia currently fund enterprise development programs through various competitiveness or MSME approaches. This assessment reveals that the private sector is quite active in recycling, hosting numerous innovative business models carving out niches in the sector. These actors can benefit greatly from activities that expand networks, increase collection, replicate collection models, improve margins, and increase technical knowledge and expertise. Furthermore, as previously presented, these businesses recognize their social contribution to the local community and can be developed into strong local actors and leaders.

**Minority & Disadvantaged Development:** It is a realistic fact that in many municipalities, Roma and other minorities account for a significant portion of recycled materials. Essentially every small and medium town and city in Serbia has at least one enterprise or family, typically Roma, who manages most of the buying and selling of metal. Paper collection too generally includes one or more Roma buyers who consolidate cardboard and paper collected by individual collectors (also mostly Roma) for sale to a larger regional buyer. Donors can focus resources on creating jobs in the recycling sector, help collectors to become more efficient so they can collect higher quantities and increase their incomes, and work with metal collectors to broaden collection to other materials while utilizing and maintaining their current collection networks and infrastructure.

**Technical Services:** International donors and actors can also play key roles in delivering technical services to recycler and other public and private sector actors to increase efficiency, facilitate networking, promote waste reduction and conservation, establish markets, and provide specific technical assistance. Potential topic areas of intervention include recycling center and landfill design, waste reduction audits for public and private actors, development and organization of markets around specific commodities that currently have low levels of recycling (e.g. glass), and even financing research and development of alternative materials (e.g. organic, rather than petroleum-based).

## Enterprise & Municipal Profiles

**Overview:** This section presents an in-depth look at each of the private sector enterprises and municipalities and JKPs. Each profile is summary of the information gleaned during the interview. The profiles are recommended reading, as they contain much more detailed information about the actors and their workings in the recycling sector. They are organized in order of private sector collectors, private sector recyclers, then municipal and public programs.

### Private Sector Collectors

#### Brdja, Trstenik

2-6-09

**Products:** PET Bottles, LDPE Folio, Cardboard, Glass, Other materials where opportunity

**Quantity:** PET bottles 7-8 tons/month: 5 tons from collection containers and additional 2-3 tons from bottling companies in Vrnjacka Banja and Kraljevo. From September 2006 to present, collected 250 tons PET. LDPE 1 ton/month from containers and several shops. Previously, collected 5 tons/week LDPE primarily from Trajal Corporation in Krusevac prior to Bulgarians buying the factory. Brdja officially employs five workers plus help from his family.



*Brdja operates like a communal waste recycler, filling a role typically served by the JKP. Communal containers are transported to Brdja's facility on a small tractor where they are unloaded; empty containers are dropped as full containers are picked up. Their sorting facility is typical for small collectors with a number of granulators (left), presses (right) and other equipment. All plastic is separated by type and color. Sorted, colored items such as bottle caps can be sold and traded to local recycler producers like those highlighted later in this section.*

**Assets:** Presses (3) for Plastic & Cardboard, Tractor, Truck, PET Recycling Containers (70), Plastic Mill (recently purchased in parts from Petrochemical in Panchevo; currently not in use; 300 kW machine can process 400 kg/hr).

**Profile:** Brdja is an interesting case in that they essentially provide city and village recycling services in lieu of JKP; in fact, JKP Trstenik has no recycling program. Brdja purchased 70 PET recycling containers and placed them around the city (60) and in surrounding villages (10). While many JKPs indicate that recycling is not a profitable activity, Brdja is providing exactly the same service for a profit; all of the investment and expenses incurred are paid by Brdja with no public or municipal subsidy. Brdja neither credits nor discredits the municipality or JKP for the program – while they receive no support or subsidy, neither are they harassed for placing their own recycling containers around the city; however, they do not feel themselves as “colleagues” of the public institutions. They have the support of citizens who show their willingness to cooperate by sorting their plastic. (This seems substantiated by Treehouse personnel when inspecting several of the recycling containers, all of which had excellent separation with virtually no contamination of other types of waste.) Brdja has expanded into the villages, a practice that many JKPs have avoided.

**Communal Collection:** Brdja feels that he is able to be profitable where JKPs can't because the public companies are not trying to operate as efficiently as possible due to their public financing. In his case all investments are his own and he therefore takes great care in the management and maintenances of his resources. He also feels that he has a better relationship with his buyers because he ensures that all

PET is consistent, whereas JKP workers do not necessarily exercise the care necessary to avoid, for example, a stray motor oil bottle that can contaminate an entire ton of PET. The margins available for recycling activities are very low, particularly in the current economic environment; therefore, diligent management of resources and minimizing expenses are his key to surviving and profiting where public companies typically do not. The equipment donations from USAID are all in full use, functioning and fully maintained.

**Markets:** Brdja bales PET bottles into 15 and 30 kg bales, and then sells it to Greentech, as is the case with other collectors. With Brzan Plast reportedly out of the PET business, Greentech is the only major buyer of PET in Serbia.



Greentech in turn sells the plastic to large recyclers in Romania and China. Brdja, unlike the JKPs visited, separates the colored caps from the PET bottles and sells them separately for a higher price (they may discontinue this practice due to the currently low price of plastic and extra labor involved). Brzan Plast in Batocina continues to buy LDPE folio.

**Expanding Collection:** Brdja would like to significantly expand his collection, placing 1000 or more containers from Kraljevo to Krusevac. He indicated that Kraljevo does not manage a recycling program (this was not confirmed by Treehouse) and claims that he can collect more PET from Krusevac than JKP currently does with its financial resources and higher number of containers. While Brdja manages ten containers in villages close to Trstenik, as a result of a few isolated problems (one stolen container and a few plastic fires) he focuses more in and immediately around Trstenik. In the more realistic medium-term, Brdja hopes to place 200 containers in Kraljevo and is negotiating with the municipality to provide this service.

**Prices & Finance:** Brdja, like other recyclers, are struggling with the current price of recycled materials, especially plastic. Brdja is paid 12 RSD/kg PET, compared to 16 before the current crisis. Colored caps now fetch 15 RSD/kg, compared to 20 RSD/kg before. In order to survive, Brdja is trying to cut expenses to the lowest level possible; he believes that if he can survive this trying year he will be able to survive the future. At present, he is struggling to break even. In addition, he has taken a €50,000 loan from the Republic Development Fund (5 years, 1 year grace period, 1% interest).

**Other Materials:** Brdja collects a small amount of paper and cardboard, 2-3 tons/month; another collector in Trstenik with close cooperation with Roma specializes in paper; his paper is sold to Umka. He also has a small stockpile of glass which he has difficulty selling. In the past he sold one truckload of glass to a company in Nis for 1.5 RSD/kg; his three-ton truck fetched 4500 RSD for which he paid 3000 RSD in transportation; he smashed the glass prior to shipment. Brdja also buys, sells and trades outside the municipality of Trstenik when an opportunity arises due to materials or quantities available.

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### Milovanovic, Ivanjica

6-6-09

**Products:** PET, hard plastic, paper, metal, tires, batteries, other. No glass.

**Quantity:** 2008: 400 tons paper; 2,700 tons metal; 30 tons plastic (all). 2009: 10 tons plastic through May 2009.

**Assets:** Press (undersized) for PET & cardboard, recycling containers, vehicle(s).

**Profile:** Milovanovic (SZR) plays a role similar to that of Brdja (above), though on a lower level, essentially providing municipal recycling services in lieu of JKP. Milovanovic owns and operates 21 ares of business space roughly three kilometers from Ivanjica; Milovanovic is the only registered business of Mr. Borisa. The company currently employs one worker in addition to family members, though in 2008 the company officially employed six workers. The company was founded as a collector in April 2007; prior to that its owner, Mr. Borisa, worked on recycling through his brother's firm in Pozega. The company is not a member of the Serbia Recycling Association. Milovanovic's goals are recycling, education, knowledge, and environmental cleanup.

**Collection:** Most of Milovanovic's recyclables (90%) are collected by individual collectors who sell the materials to the company. Milovanovic does not directly employ any collectors but has about 50 "regular" collectors plus an additional 150-200 who collect from time to time. All recyclables collected are paid in cash on the spot, a practice which Milovanovic feels encourages collection. Only 10-20% of the collectors are Roma, due to Ivanjica's relatively low Roma population. Before 2008, when plastic prices were higher, some recyclables were periodically collected from the river, but since the price decrease no one is doing this. Several recycling containers (wire bins) are placed near shops. Several of the containers were observed by Treehouse during the survey and while they are not prevalent in the city they appeared to have good separation. Milovanovic also has approval to separate recyclables at the landfill and has someone doing that, retrieving the waste from the landfill with a company truck. Again, the waste collected from the containers and landfill is less than 10% of Milovanovic's total.

**Collection Challenges:** Milovanovic highlighted several issues related to increasing collection. First, some shops are not cooperating on using the cardboard recycling containers – they often don't separate, contaminate the cardboard with other waste, and sometimes even burn the cardboard. Since cooperation with a limited number of shopkeepers is difficult, Mr. Borisa is hesitant to make further investment to target collection from the general public. The economic crisis has also affected business, as collectors expect to be paid higher based on previous market prices, and are disappointed when they are paid at current levels. Mr. Borisa believes that fair prices and cash payment are among the



ways to increase collection. He also says citizens and government must respect those people who are willing to separate recyclables at the landfill.

**Processing:** Due to the relatively small population of Ivanjica (roughly 35,000 in municipality) it is not logical to host a collection center, but rather to keep processing limited simply to baling with no shredding or further processing. At present, Milovanovic's press is undersized for his use, while JKP owns a larger press donated by USAID.

**Cooperation with Public Sector:** While there is minimal cooperation between Milovanovic and the Ivanjica municipality and JKP, there are some minor successes. First, the public agencies allow Milovanovic to place containers around the city (though did not offer any guidance or recommendations). Second, Milovanovic has approval from JKP to collect recyclables from the landfill. And third, Milovanovic buys some of the recycled materials from JKP (though he is careful when doing so due to previous problems with contamination of bales). So while the public agencies have been somewhat liberal with Milovanovic compared to other municipalities, they have not provided any real active support. For instance, when Milovanovic was in the registration and licensing process, he had some meetings with local officials at which time they were positive. Despite his optimism, he still waited 5-7 months to complete the "expensive" process. Mr. Borisa would actively participate in waste management meetings with the public agencies if invited.

**Markets & Trade:** Milovanovic manages recyclables throughout Serbia, though paper and PET only locally. PET is sold to Bima in Cacak where it is consolidated for shipment to Greentech. Milovanovic pays about 1.5 RSD/kg for paper and sells it for about 3 RSD/kg, leaving a margin of only about 0.2-0.3 RSD/kg margin after transportation and expenses. Prior to the crisis Milovanovic sold paper for 11-12 RSD/kg; steel was 16 RSD/kg and now sells for 6; specialty metals are also affected, such as copper which now sells for 150 RSD/kg, down from 250-300 RSD/kg.

**Media:** Milovanovic places regular advertising spots on the local television, both to advertise his business and to influence peoples' viewpoints to dispose of their waste in acceptable manners, especially to not throw it in the river.

## Novak, Prijepolje

6-7-09



*Novak in Prijepolje collects and separates plastic materials and paper, in addition to operating their cardboard box production plant. Shown here is milled plastic sorted by color and type, ready for sale to small plastic production enterprises.*

**Products:** PET, hard plastic, paper, aluminum (sold to Ball Metal Recan project).

**Quantity:** PET 20 tons/month; hard plastic 40 tons/month; paper 100 tons/month collected (not including purchased and processed).

**Profile:** Novak is a collector of various recyclables and producer of cardboard boxes. The business was started in 2005 with a loan of 80,000 RSD and it now owns its property and facility, three trucks, and plastic processing and cardboard box production equipment. The cardboard box line is a recent addition that began with pressing paper and expanded into pizza boxes and later corrugated cardboard; the company currently buys cardboard sheets from Unka and Vladicin Han and produces boxes, so it is not direct recycling. The box business has grown 50% in 2009 and now seems to be the main focus. The company has a license for 1000m<sup>2</sup> expanded facilities and has 12 employees. The company's owner does not feel that the company has been negatively affected by the economic crisis, since the problems of big companies have opened opportunities for small companies.

**Collection:** Novak's primary collection comes from smaller buyers in the area, mainly Roma and their networks. They also support roughly ten individual collectors almost as full-time, several of whom collect plastic from the lake. PET is milled and sold to Greentech; milling allows Novak to pack 20 tons per truck instead of 7-8 tons for baled PET, thereby

reducing transport costs. Novak also buys and trades hard plastic and paper from a collection center in Valjevo. JKP Prijepolje has no public recycling program so Novak has placed their own containers near shops around Prijepolje, though the amount collected is smaller. Novak could increase the amount they collect by increasing processing capacity, as they currently operate at maximum.

**Public-Private Issues:** Novak does not directly cooperate with the municipality or JKP, pointing out that while JKP has no recycling program, the municipality will not allow Novak to place its containers on public property; therefore, they only

have containers at shops and monasteries. The company's owner feels that inspection and enforcement of fines for dumping need to be strengthened; but before that the municipality needs to provide the public resources necessary for responsible waste management; he regularly appears on television to advertise his business and to promote recycling.

**Donor Assistance:** Novak received a press and plastic grinder from USAID; the locally-produced equipment was reported to be high quality and comparable to equipment produced internationally. Novak's owner attended the IFC seminar and stated that it was useful. Municipalities could help with subventions on a quantity basis to support recycling.

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### **Eurosparta, Krusevac (Euromodera, Aleksinac)**

1-20-09

**Products:** Plastic LDPE Folio, Paper

**Quantity:** Current LDPE capacity 60 tons/month, collecting 10 tons/month average. Plans to double capacity of LDPE and add 20-25 tons/day of paper.

**Assets:** Press, Shredder, Trucks (3), Granulator (under construction).

**LDPE:** Eurosparta and partner company Euromodera, Aleksinac collect and recycle plastic LDPE folio. The companies are owned by two brothers with related operations in the two cities. Eurosparta is a collector (mediator) only, collecting and baling LDPE, then transporting it to Umka Belgrade for sale. They collect plastic in a temporary lot (near Rubin alcohol factory) but plan to move into a large 300 m<sup>2</sup> hall & collection center on Jasika Road (industrial zone), providing easy drop-off for collectors and decreasing their costs. They are also considering placing containers around town in places where JKP doesn't manage any.

**Collection:** Eurosparta collects LDPE from several factories in Krusevac, including Merima and Fam; purchases from individual collectors in the area (2<sup>nd</sup> or 3<sup>rd</sup> hand collection); and have some collectors working directly for them. Krusevac has high potential with a number of industries utilizing stretch folio, shrink wrap, PET and other materials. Eurosparta pays their collectors on the spot, but usually waits for payment from Umka.

**Future Plans:** Eurosparta is planning (or is currently being manufactured) to purchase an LDPE granulator, and perhaps an extruder for producing plastic bags.

**Paper:** Eurosparta collects some paper from Roma, though it is not their primary activity; it seems they simply pick up the paper on request. They have plans to buy waste paper, sell it to a recycling colleague who processes it into pulp, then return to Eurosparta for producing large paper rolls.

**Glass:** Eurosparta spoke with an Italian firm to provide ground glass, which could be collected from consumer waste, restaurants, and separate containers in the city.

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### **Kalimero Komerc doo, Krusevac**

1-20-09

**Products:** Glass Jars & Bottles: All except some imported hard liquor bottles; no windows or flat glass; no broken bottles or jars. Plastic: All HDPE and hard plastic (no PET or LDPE).

**Quantity:** Glass: In 2008 450,000 bottles on location, plus an additional 150,000 transit (arranged sale or trade directly from collector to buyer). HDPE: Roughly 30 tons since May 2008 (14 trucks at roughly 2 tons/truck).

**History & Trade:** Mr. Popovic started as a drink wholesaler in the early 1990's (from 1994-2007 Mr. Popovic was engaged in various businesses). As a drink wholesaler, the breakage of bottles and damage to plastic cases during transportation and storage is a significant problem, sometimes reaching 20-25% of stock; distributors charge these costs to the wholesaler (650 RSD per full case with bottles). Every year, the company would replace roughly 5000 cases and 50,000 bottles. Recycling thus began as a way of replacing damaged bottles and cases. As collection increased, the company began regularly accumulating an excess of bottles and cases and began selling them to other distributors in the same situation, or trading bottles and cases for other goods. They then started buying scrap HDPE (drink cases, fruit trays and other plastic) and trading the material to molding companies in return for new drink cases (getting new cases for free); these were subsequently traded to other distributors for more bottles and other goods.

**Krusevac Collection:** In Krusevac, Mr. Popovic think that marginal gains in glass collection can be gained, though he feels that the largest users of bottles (cafes and restaurants) are already recycling through him. Sometimes they bring the glass themselves (usually involving cases where café workers are taking the money, either by permission or not of the café owner); more often Mr. Popovic's hired drivers collect the glass, which the cafes generally organize and

separate for pickup. Most of the consumer glass and hard plastic is collected by Roma. As he currently has no advertising, he is considering putting a sign out front so that people know he buys glass, hoping to capitalize more on excess jars and bottles in peoples' homes and basements. (His recycling activities are recent; previously, the lot where he collects was a car wash.)

**Serbia Collection:** Kalimero's operations cover roughly half of Serbia, mostly individuals with trucks who deliver glass and plastic to Kalimero from other parts of Serbia. Significant collection is done in Kraljevo, Nis, Zajecar, Jagodina and Leskovac. They have not had success in cooperating with the regional JKPs and don't generally have a favorable opinion. Mr. Popovic says he often gets offers, propositions or recommendations from employees of Krusevac JKP to help him collect more materials, but not from JKP management. He reportedly approached JKP to discuss the possibility of collecting glass from the regional landfill but was informed that, should they approve, he would need to pay for the rights. (During Treehouse discussions with JKP, they indicated that they do not have a market for glass.) He stated that the city of Novi Sad, which he says operates a recycling center, is the only municipality that has requested an offer for their glass; transportation costs from Novi Sad, however, are prohibitive.

**International Collection:** Mr. Popovic says that he has an arrangement for collecting in the Banja Luka landfill, where he periodically employs three people to collect and transport to Krusevac (they earn €1000 per truck). He also has collected from Nikcic, perhaps collecting bottles and jars from there in return for beer bottles for the Nikcicko beer factory; and Podgorica, since he stated that they only have one plant for filling bottles and therefore have a huge surplus of bottles.

**Markets:** It seems that Kalimero deals mostly with physical persons or other traders (90%), and much less directly with bottlers (10%, usually wine producers). Again, many times commodities are traded rather than purchased. The business is quite interesting in this way, and Mr. Popovic says that he is able to target his recycling activities according to the production of the region; for example, in cities with wine production, he knows there will always be a deficit of wine bottles; similarly for beer, rakia and other liquor. Also, as seems logical, there is a similar business or individual in each of these cities like Mr. Popovic with whom he conducts most of his trade. Because of this nature of trading, Kalimero works with many different individuals and businesses with different goals and motives; often, they collaborate to meet larger demand, and sometimes coordinate transport. Since so much is based on trading, it is quite easy to envision this business as an interconnected recycling loop for HDPE and glass.

**Prices:** As mentioned by all of the recyclers the world economic downturn has dramatically affected their businesses, as the prices for recyclables has declined considerably, especially plastic which is closely tied to the price of oil. Though pre-crisis prices weren't cited, current pricing is 3-5 RSD each for jars and bottles (depending on size and cleanliness) and 18 RSD/kg for HDPE. He pays immediately on delivery.

**Challenges & Opportunities:** As heard throughout this assessment, the main problem faced by Kalimero is transportation. Mr. Popovic is considering buying a jar/bottle washer so that he can get a slightly higher price (or better trade) on exchange. A bottle/jar washing machine and billboard advertisement on his premises was also noted.

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## Papirus, Krusevac

1-21-09

**Materials:** Paper, all types.

**Quantity:** Currently collecting 350-400 tons/month. Before economic crisis 500-600 tons/month.

**Assets:** Press with capacity 30 tons/day plus 4-5 smaller presses. Five trucks, two for large bin containers and three smaller, standard trucks.

**History:** Papirus has been recycling paper in Krusevac since 1997. They collect and sort paper for sale to paper processing companies, primarily Umka. In 1998, Mr. Arsic built a building for collecting and sorting paper. He is the primary collector of paper in Krusevac (though other recyclers seem to periodically collect paper at a lower level when they have the opportunity).

**Prices:** The price paid for recycled paper has also been affected by the global economic crisis. Before the crisis, the price for cardboard was roughly 4 RSD/kg compared with the current 2-3 RSD/kg. Sorted white office paper now fetches 4-5 RSD/kg, compared with 10-11 before the crisis. Papirus did not apply for assistance under the CRDA program.

**Krusevac Collection:** Papirus has agreements to collect paper from large retailers: YuKomers, DIS, and Maxi supermarkets. He provides them with large bins where they sort their cardboard packaging. Papirus is also the primary



purchaser for paper and cardboard collected by the Roma, through Roma intermediaries who collect the paper inside the city and call Mr. Arsic for pickup when their storage capacity is full. Roma account for approximately 12-13% of the total collected, currently 18-20 tons/month; prior to the economic crisis Roma collected 30-50 tons/month (due of course to the lower price). They also organize twice per year (spring and fall) collection at Krusevac schools, where they provide containers and subsequently share a portion of the income with the participating schools.

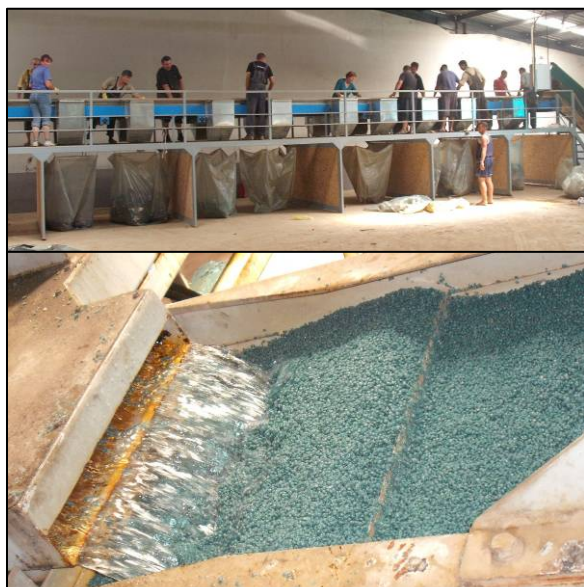
**Regional Collection:** Outside of Krusevac, his network reaches Vrnjacka Banja, Cicevac, Aleksandrovac and Brus; he indicated that Cacak and Nis have good organization already with similar businesses like his own, while Kraljevo and Trstenik do not. They periodically collect from Jagodina, Cuprija and Paracin but the collectors there do not press the cardboard, so transportation costs are much higher. Mr. Arsic has provided several small presses for clients outside Krusevac to facilitate collection.

**Collection Improvements:** Mr. Arsic said that collection could be improved by providing small presses to regional collectors (Jagodina, Paracin, Cuprija). Obviously, increasing the price for paper will increase collection back to the higher levels; short of economic recovery perhaps a short-term government subsidy would help. Improving transportation logistics (as for all recycling activities) can also increase collection.

## Private Sector Recyclers

### Brzan Plast, Batocina (near Kragujevac)

7-24-09



*Brzan Plast is one of two large plastic recyclers in Serbia, the other being Greentech in Novi Sad. In the top photo, the process begins as Brzan Plast workers separate plastic by type and color on a conveyor. The company produces granulate (below) in addition to LDPE folio bags of various sizes, baled and cleaned PET and other plastics, and a number of other plastic intermediaries.*

**Materials:** All plastic, of which sort, clean, granulate and produce LDPE folio.

**Quantity:** Total processed: 2007 – 3,000 tons; 2008 – 5,000 tons; and 2009 – 3,000 tons.

**Buy Pricing:** Baled PET & Plastic Folio: 12 RSD/kg.

**Assets:** Large processing line consisting of line sorting, washing, pressing, granulation, extrusion and production of LDPE folio products installed in 6,000 m<sup>2</sup> of enclosed space; numerous vehicles and mobile press.

**History:** Brzan Plast was started in 1990, originally producing plastic products such as water and sewerage pipes and folio products (this part of the company still exists and is located in a nearby facility). In 2001, Brzan Plast started recycling plastic, taking the venture seriously and making considerable investment; the original firm uses granulate from the recycling line. At present, Brzan Plast employs 60 workers working in three shifts.

**Collection:** Brzan Plast's first recycling agreement was for importing used plastic bags and bottles from Austria; they grew, increasing suppliers until at one time they served 180

suppliers. In 2007 about 45% of the processed plastic was collected from landfills. Currently suppliers are mostly private sector intermediate buyers and collectors, but include some municipalities. Most of the plastic is purchased baled but Brzan Plast's mobile press is also used. Four large suppliers supply about 50% of his capacity: Interkord in Subotica, Saniplast and Pima in Cacak, and Nives in Nis. Brzan Plast also has suppliers from Kosovo (Podujevo) and Bosnia (Gracanica). Mr. Simic thinks that plastic recycling is at a too-low level in Serbia and more separation and collection is needed; demand for increased production is sufficient if collection can be expanded.

**Municipal & Communal Collection Initiatives:** In 2004 Brzan Plast placed 20 containers around the village of Batocina and had good results with citizens separating their plastic. ACDI/VOCA, through the USAID-funded CRDA project, also financed some 2,500-3,000 recycling and trash containers in numerous municipalities including (according to Mr. Simic) Jagodina, Kragujevac, Kraljevo, Smederevo, Smederevska Palanka, Gorni Milanovac, Knic, Velika Plana, Arandjelovac, Mladenovic, Paracin and Batocina. At least some of these donations were driven in part by Brzan Plast. ACDI/VOCA also purchased mills as part of some of the donations, though this was perhaps not the best use of



resources since the public companies generally didn't sufficiently separate the plastics by type and color before milling, essentially rendering the milled plastic worthless. With many municipalities already supplied with containers and some municipal programs operating, Mr. Simic feels that it is time to increase collection by expanding outward from current initiatives.

**Current Initiatives:** At the time of this interview Mr. Simic was traveling to Lucan for a tender of 70 recycling containers to be placed in Guca for the annual festival, after which they are intended to remain and perhaps expand geographically; these were financed by the Municipal Environmental Fund. Raca municipality is also tendering 40 recycling containers and a press, funded by the municipality (70%) and the Municipal Environmental Fund (30%).

**Economic Crisis:** Decreased fuel prices in autumn 2008 resulted in prices for new plastic to fall from around €2.0/kg to €0.5/kg, lowering the demand for recycled plastic. During the crisis, Brzan Plast was able to stockpile raw materials and continue to produce folio products and granulate according to demand. At its peak the company had 90 workers and the possibility to increase further, but was forced to lay off 30, leaving 60 at present. An agreement reached with a Greek collector to import 300 tons/month of plastic to Brzan Plast was negotiated but later canceled due to the crisis and prices.

**Other Cooperation:** Brzan Plast is periodically in contact with Greentech, who according to Mr. Simic, is connected with a large Romanian factory. They sometimes work together to fill larger orders, such as in August 2009 when Greentech contacted Brzan Plast to participate in a 150-200 ton order. Brzan Plast has also designed processing lines and produced equipment (with their two manufacturing partners) for other recyclers in Subotica and also Kosovo and Bosnia. Mr. Simic noted that his locally-designed equipment is better than the industry-standard European models for Serbia, incorporating an additional washing cycle, since the baled plastic input is dirtier than in many European countries since separation and handling are typically not as diligent.

## Nikolo, Krusevac

7-30-08

**Materials:** LDPE, HDPE, PP.

**Production:** Nikolo's main production is packaging, primarily plastic containers and lids for food, chemical and agricultural products. Of his total production, 60-70% of the plastic he uses is recycled and 30-40% is virgin material (by law, recycled plastic may not be used for food or beverage containers).

**Collection:** Most of the recycled material collected by Nikolo is LDPE bags, most of which come from factories in the region with which he has an agreement. Trajal is the largest of these, providing 4-5 tons per month of pressed LDPE and HDPE. The next highest portion consists of 10L and 1L canisters from health centers in Krusevac and Kraljevo (8 tons/year of HDPE and PP). The FAM company provides some new material, roughly 1 ton/month, either defective bottles or excess PE scrap. These high quantities of sorted and clean plastic help minimize costs, and the fact that Nikolo takes all of these clients' plastic ensures healthy long-term relationships. An additional 4 tons/year are collected from other producers of plastic goods. As with other recyclers, Nikolo trades his excess plastic to other recyclers (in his case, sorted, colored plastic that he does not use) for plastic that he needs.



*Nikolo in Krusevac produces plastic containers and products for food, chemical and other products. Nikolo explains that Serbian law prohibits recycled plastics for use in food containers; but products such as liquid soap, industrial oils, and other chemical products can all be packaged in recycled plastic. At present Nikolo only recycles industrial plastic, which is much cleaner and more uniform than consumer waste.*

**Consumer Waste:** Nikolo does not recycle any consumer waste, as it requires high quantities of water, energy and workers, and his economy of scale does not support this. He is, however, preparing for opportunities in consumer waste by following new laws whereby firms are obligated to recycle certain quantities or support recycling companies, perhaps through some sort of strategic partnership.

**USAID Donation:** All equipment donated by USAID was high quality and has not required any service other than routine maintenance. This is important for him since extra costs can dramatically affect his operating margins. He attributed the quality to willingness to meet his requirements and his providing precise specifications.

**Business & Cooperation:** Nikolo has no problems with supply of raw materials as he has nearly constant supply from his providers. There is some seasonal fluctuation on the demand side, increasing in spring and summer. The company manages this by organizing their production; for example, during one month in winter they are able to satisfy one client's demands for the entire year. One challenge faced by Nikolo, as well as many MSMEs in Serbia, is delayed payment from clients. As his business has become stronger, he has dropped late-paying clients and focuses on providing his good clients with excellent service; as a result they have increased their profits and improved their quality of services. There are no current legislative issues, either positive or negative, that affect the business. Cooperation with regional JKPs has not been particularly favorable.

**PET Opportunities:** Nikolo is considering PET recycling and has looked at purchasing a processing line (\$20,000-\$25,000 plus taxes and shipping) produced in China. The line would provide only granulate; an additional \$30,000 is required for producing performs, and \$10,000 more to blow the bottles. The economics are such that he will make the investment only in case he can make it work with two workers processing one ton per 8-hour shift. In this case, at 10 RSD/kg PET, plus 4,000 RSD expenses per 8-hour shift, he can realize a margin of €100 per shift. After financing transportation, maintenance and other expenses, he believes he could realize a net profit of €800 euros for each 16-ton truckload (to Novi Sad). As evident in these figures he could realize slightly more than one truck per month. For much higher investments a PE, PP and PS recycling lines cost can be procured for €100,000-500,000; or for €1.5 million automatic separating equipment that sorts plastic by material based on its density.

### Vlada-Pak, Beloljin & Blace

1-23-09

**Materials:** LDPE & HDPE (40%), PP (30%), PS (20%), PVC & PA (10%).

**Quantity:** Average 10 tons/month processing (winter 5 tons/month, summer 15 tons/month); interested in tripling capacity by adding two more shifts. Recycles 50% of plastic into new products at his facility; separates, packs, shreds and sells remaining 50%.

**Production:** Vlada-Pak is a true "recycler," operating two production facilities in Blace and Beloljin where he extrudes and molds various (20 at present) consumer products from an assortment of plastic materials. The plant in Beloljin was opened most recently because of its strategic location at the intersection of the Blace road with the Kursumlija-Prokuplje road; the location also has an approach for trucks and no residential neighbors to be interrupted with his activities. He also manages a small shop in Blace where he sells plastic products, both his own and those of his recycling colleagues with whom he trades both raw materials and final products.



*Vlada-Pak is a true "recycler." The company buys and sorts all types of plastic, processes and sells intermediates, and produces a number of consumer products. The company's biggest product is LDPE plastic bags and folio, mostly for agriculture supply and fruit packaging. The company also produces a number of small injection-molded household consumer items.*

**Prices:** Recycling plastic has become less economical since the global economic crisis. The present price for new granulate is 67 RSD/kg compared with 150 RSD before the crisis. Vlada-Pak now receives 40 RSD/kg for shredded, sorted and packed colored plastic (a difference of only 27 RSD/kg). For the raw recycled plastic, they pay 20 RSD/kg to the Roma collectors; as a result of these economics many plastic companies have stopped using recycled plastic. Even Vlada-Pak has started using some new plastic; versus when the price was higher they used 100% recycled plastic for all their products.

**Supply & Demand:** Vlada-Pak has a shortfall of recycled plastic material, having more demand for their products and materials than they can currently meet. This is exacerbated by the global economic crisis as it has become less lucrative for collectors to collect plastic. During summer they have enough plastic to meet their demands but since they have no storage capacity they must process all of the plastic as it's received.

**Collection:** Vlada-Pak obtains 60% of their raw plastic from factories in the region (Trajal, Kabolva, Toplichanka) and from the JKPs in Prokuplje, Blace and Kursumlija. An additional 10% is from their production leftovers. The final 30% is collected by Roma, some of whom work directly for him and others who work independently. The most interesting part about Vlada-Pak's collection is that it seems to really clean the regional environment. Mr. Djordjevic cited three cases:

1. The first case is one Roma man who owns a small truck and employs two workers. Together they collect plastic primarily from stagnation points along the Toplica River. The three collect 700 kg of plastic in roughly three days, for which they're paid 14,000 RSD; subtracting expenses of roughly 2,000 RSD the manager pays both workers and retains the balance. Mr. Djordjevic says that in total, during warm summer months, they can collect 15 tons/month of plastic from the Toplica River.
2. One Roma man works in the morning in a small truck, traveling 50 km along the road and collects roughly 50 kg of plastic; he drops the plastic in Beloljin then travels in the other direction in the afternoon. In one day he earns 2000 RSD (at the current low price).
3. Other Roma are collecting independently and transporting to one or the other of Vlada-Pak's facilities by horse or donkey (a typical means of collection).

**Sorted Plastic Markets:** Of the plastic that Vlada-Pak collects, roughly 50% is processed into new products at his facilities, and 50% is sorted, packed and resold. Vlada-Pak produces 20 products, including LDPE bags, PP flower pots, and an assortment of containers and home utensils. The plastic that they do not use, they separate, shred and send to Greentech in Backa Palanka; from there, Mr. Djordjevic says the plastic is sent to Romania where it is further separated and cleaned, then sent mainly to China. A small percentage of the clean bottles he collects are sent to one of his colleagues in Vrnjacka Banja where he trades those and some of his own products for his colleague's products and materials.

**Increasing Collection:** Again, transportation is the biggest obstacle to increasing collection. Roma could collect more with transportation. Vlada-Pak doesn't have a truck and leases one when they have to collect larger quantities. For this service, they pay €1/km plus fuel; so for one 30 km trip, the company pays about €33. If they had their own truck they would pay only about €3 (plus of course the annual expenses). Mr. Djordjevic believes that the truck would investment for the truck would break even in one year; however, he has been using his income for new pieces of equipment and opening the plant in Beloljin.

**Future Plans:** Mr. Djordjevic reinvests all of his income that he can back into his business. At the Beloljin facility Vlada-Pak has two workers working one shift, or 30% of capacity. Mr. Djordjevic wants to expand the facility; add a small office with computer and internet; and construct a corrugated metal collection station and storage, plus a billboard out front advertising that he buys recycled plastic. If he can increase his collection, he plans to hire six more workers (all of his employees are women) to sort plastic during three shifts. With 70% of labor is devoted to sorting, and one person able to sort 500 kg during a three hour shift, the business could sort over 2 tons/day while still meeting all of the processing requirements. Related to transportation, he currently has three vans with 300 kg capacity; he would like to help invest in a small truck with 500-800 kg capacity for his Roma collectors.

**"Export" Markets:** Vlada-Pak exports some of his products through a partnership arrangement with area plum growers who export plus to Germany and Holland. He sells 10 tons of LDPE bags per month (100,000 bags in sizes of 10 kg and 50 kg). For a 50 kg bag (110 cm x 550 cm weighing 100g) produced from new material the production cost is 156 RSD/kg, compared with 50 RSD/kg (20 RSD plastic plus 30 RSD labor and other expenses) for a recycled bag. Since he sells the bags for roughly the same price, he is able to secure roughly one million RSD extra per month using recycled bags. In addition he says, "Since the bags are made from 100% recycled plastic, he is essentially exporting garbage from Serbia."

**Donor Initiatives:** Mr. Djordjevic participated in the USAID-IFC recycling seminars and study tour to Vojvodina in 2007. This obviously had a positive impact on his business as he demonstrated some of the tests used to identify plastic materials and showed the Treehouse representatives the IFC and Greentech presentations and handouts, on which he had added many of his own notes. He indicated that most useful was the information they learned during the seminar and contacts; he maintains contact with the international IFC consultant and other Serbian recyclers. Areas where donor intervention would be useful now include: i) training or seminars in new sorting, milling and shredding equipment and technology; and plastic manipulation; and ii) seminar or study tour on European experiences and markets.

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### Nima, Krusevac (Modrica)

7-30-08

**Materials:** LDPE plastic folio for agricultural purposes

**Quantity:** Nima collected 7-8 tons of LDPE from spring 2007 through summer 2008. In 2008 they expect to increase substantially and are currently collecting ½ ton per month from various SMES in addition to the material from agricultural producers (which generally occurs in the autumn).



**Production:** Nima is a relatively small company that started recycling LDPE folio from producers in 2007 after receiving a USAID equipment grant. They collect LDPE folio used for agriculture purposes – greenhouses, plastic sheeting, bags and other plastic folio – and recycle it into bags and folio of various sizes and thicknesses ranging from small plant bags to large bags and sheets of plastic folio up to 800mm in width. Their process consists of washing, granulating, drying and extruding into new LDPE products. Since their collection and sales are mainly seasonal they wash and store the plastic for periods of time while they process to meet their demand. They sell their products to shops (shopping bags) and back to agricultural users beginning in February with greenhouse and early planting, and continuing through summer. As with other recyclers they also trade with their clients, offering them a discount or trade for their old plastic in exchange for new Nima products.

**Recycled & Virgin Material:** Nima was a recipient of a USAID grant, receiving a granulator for recycled LDPE; prior to this they worked only with virgin material. In addition, they were not able to reuse their own scrap and were forced to dispose of it or give it away for free because they couldn't process their own waste. In addition to the recycled material Nima also buys and uses 3-5 tons/month of virgin plastic (25 tons in previous 7 months) depending on what they're producing and the quality (elasticity, thickness and color) needed. For example, their shopping bags only contain 20% of recycled LDPE, while garbage bags contain up to 70%. They sometimes include additives, or different types of plastic, to achieve the desired elasticity and color.

**Collection:** Nearly all of the raw LDPE is collected directly from agricultural producers; there are no collectors working for or selling to Nima. Most of the LDPE collected is from 10-15 larger producers in the region and is collected in the autumn, beginning in September. They are also currently collecting from several SMEs in the region, approximately ½ ton per month.

**Payment Challenges:** Being a small company it seems that their major challenge is in accounts receivable and cash flow. When asked about expanding their business and the amount of material they recycle and process, Ms. Djordjevic believes that they certainly could expand and have the capacity to do so. However, that would mean entering markets with bigger wholesalers who are notoriously late with payments, a luxury that Nima can't afford. For this reason, they even now tend to work only with clients who pay within 30 days and adjust their production according to their clients' demands. The larger companies and wholesalers pay after 120 days, or even later. Even taking the care in servicing only paying clients, they have many small buyers who owe them various amounts from 2000-7000 RSD, small amounts but ones that add up for a small enterprise such as Nima. Meanwhile, the company that sells granulate requires payment within 30 days, and if payment is late the company will block their account until paid. As a result, Nima has never taken credit and has no plans to do so for fear of losing the company or its assets. They recognize that they perhaps could develop faster but are not willing to take the risk.

**Public-Private Partnerships:** As with many other private recyclers, they have not had positive relations with public companies. First, they do not see the public companies willing and positioned for cooperation with the private sector. Second, Ms. Djordjevic feels that she lacks the politician connections perhaps necessary to advance cooperation with Nima. And finally, several of the JKPs in the region (Cicevac, Cuprija and Kraljevo) still have outstanding balances with Nima. While they have not worked with Krusevac JKP, Ju-Komers, who supplies JKP, also has an outstanding debt.

**Opportunities:** Nima sees an opportunity in small planting bags used by seedling producers and tree nurseries. The bags are essentially a small pot with a number of holes for drainage and seepage into the bag. The bags are placed in the ground with the plant and removed when the plant is purchased. For seedlings, the bags require only one year or less of life, while for trees up to three years (different qualities are required for the two purposes). The bags also use a high percentage of recycled material; those that must survive for longer periods, however, require a mix of HDPE and LDPE, which Nima does not have the capacity to provide without additional investment (\$15,000). At present, most companies are importing these bags in large quantities but they could easily be produced domestically.

**Cooperation:** Nima indicates that they do cooperate with other recyclers in the area, specifically mentioning Nikolo. In addition, they have cooperated with the Krusevac NGO Bela Breza, supporting some environmental cleanup actions with bags and materials.

**Impact of USAID Assistance:** Nima was a recipient of a regranulator and participated in the study tour to Vojvodina in 2007. As a result of the donation, Nima hired and registered four new workers (their agreement required only two). Financially speaking, as a result of the investment they were able to reprocess 1.5 tons of their own scrap, plus the 7-8 tons of recycled plastic. For each kilogram of recycled plastic, the company saves €0.5, for a total of roughly €4,500 in the past year. While some of this is offset by the increased labor and utility costs, Nima still estimates that they netted higher profits of €1000-€1500. Nima was satisfied with the program, indicating that they found it simple to work with



Mercy Corps (USAID implementer) and the manufacturing company chosen in the tender to produce the regranulator according to their exact needs.

**Legislation:** Nima is not aware of any legislation or programs that will impact recycling in Serbia. They feel that there is no support from the state on either recycling or the challenges faced by SMEs in Serbia. A number of years ago, when legislation was passed that all payments should be made via bank transfers, they hoped the situation would improve, though it has not. The company also lost money on the privatization of Zastava, after which Zastava did not honor some outstanding obligations; Nima tried to block the account for payment but the Agency for Privatization stepped in and removed the block. Another case was cited where a 2 million RSD payment by a client to Nima was inadvertently sent to the wrong account which had been blocked for nonpayment of other debts; and the money for Nima was not released, despite the error.

## Interprodukt, Nova Varos

6-7-09

**Materials:** PE, PP, LDPE, and other plastics. Unclear regarding PET, though may be separating and recycling colored caps from PET bottles.

**Quantity:** 350 tons/year total plastic, 250 of which is recycled.

**Assets:** Complete plastic molding factory with processing equipment for recyclables. Owns and operates 3000m<sup>2</sup> of asphalt space and 1000m<sup>2</sup> under roof; has own electrical transformer, water supply and wastewater treatment; no expansions planned as the company is currently at "95% of planned;" no credit taken in past ten years.

**Production:** Interprodukt buys various secondary plastics and "refreshes" them into other products, including fruit trays, bus seats and chairs, seat belt components (partnership with Macedonian firm), folio products, bottles, and also sells and trades granulate. Interprodukt is essentially a "closed loop" since it deals very little in recyclable commodities and almost exclusively on final production. Some products, such as fruit boxes, are made from 100% recycled plastic (except white) while others, such as visible pieces of bus seats, are only partially recycled. The company was started in 1991, is solely owned by Mr. Golubovic, includes a retail outlet, and exports some products.

**Collection:** Most of the recycled material processed by Interprodukt comes from final users; for example, beer cases from drink distributors and battery cases from a lead recycler in Sombor. Some individuals also collect and sell, but this method accounts for a smaller percentage. For suppliers and consumers of his final products (for example berry farmers) he gives a discount on orders for recyclables returned. His buying prices are the same in all cases.



*Interprodukt recycles hard plastics into industrial products such as bus seats and fruit trays. Most of the collection is organized from final users, for example beer cases from drink distributors or other industrial plastic users; the company does not rely on individual collectors. The municipality of Nova Varos seemed to have an unusually high number of plastic recyclers; this should be examined.*

**Supply & Demand Issues:** Interprodukt's supply and demand issues are seasonal and easy to predict due to the types of production (e.g. fruit cases for various berries, fruits and mushrooms). They expanded into seats and chairs to cover the low production period in winter and this has been successful: Mr. Golubovic says that a plastic company must survive through February if it is to survive the year. The company also covers surpluses and shortages by trading recyclables, and they practice an arrangement with one company in which they trade raw plastic materials in exchange for temporary workers from the larger partner.

**Challenges:** As with the other businesses, the top challenge for Interprodukt is receiving payments. Related to recycling, Mr. Golubovic said that some people in Serbia still have a negative stigma associated with recycling and he has developed some sales pitches to encourage them to buy more recycled products. The economic crisis has of course affected the business, but not to a dangerous level. Fruit production was maintained so the demand for fruit boxes didn't suffer drastically, and the demand for bus seats has increased as some cities in Serbia upgrade their fleets. He said that recyclers who deal in intermediary products like granulate suffer more since the price of new plastic is nearly as low as recycled (due to the drop in oil prices). Mr. Golubovic sees opportunities for EU markets due to Serbia's cheaper labor, and views accessing EU markets as a good way to prepare Serbian businesses for eventual EU membership.

**Donor Assistance:** Mr. Golubovac has attended several trainings related with recycling and business management, including the IFC seminar which he found very useful for its technical content. He has also visited recycling programs in several European countries. He received a plastic grinder from USAID, which he is currently using, was good quality, and was received as expected and specified. Desired equipment upgrades include a plastic washing system, higher capacity folio granulator, and a cutting machine for large plastic barrels. Mr. Golubovac would also be interested in participating on a regional collection center and would be willing to provide space or serve some key role.

**Public-Private Interests:** Interprodukt does not cooperate with the municipality or JKP, but is in good relations with them. There may have been some discussions to cooperate when JKP received its USAID donation but nothing was realized.

## Maxi-Plast, Krusevac (Pepeljevac)

2-3-09

**Materials:** HDPE, PP in small amounts

**Quantity:** Maxi-Plast processed 47.2 tons of plastic, mostly HDPE, in 2008; only a small percentage (10% or less) is recycled. The company employs nine workers, all officially registered and salaried.

**Assets:** Injection Molding Machines (9), Mill, Lathe & Drill Press (machine shop). Many of the injection machines were built or refurbished from parts by Mr. Maksimovic. The company has recently built a new building where they plan to consolidate all of the machines and operations (which are currently spread out in at least four different spaces on two nearby properties).

**Production:** Maxi-Plast produces a wide assortment (hundreds) of mostly small plastic bottles and lids for mostly household chemical, cosmetic and soap products that they produce in a wide range of colors (tens) for their customers. Maxi-Plast uses only a small amount of recycled HDPE (10% or less); the only HDPE recycled is plastic containers from hospitals in Leskovac and Krusevac purchased through an intermediary; in this case they can see and inspect exactly what they are getting. Since all of their products must meet high specifications they do not purchase any recycled milled plastic. They do not recycle any colored plastic since any small variation can put an entire production lot out of specification. At this time, they do have on hand 1.5-2 tons of recycled plastic waiting for the proper application to be used.



*Maxi-Plast is a small injection-molding manufacturer of plastic bottles for a wide variety of consumer products. In general, Maxi-Plast clients have specifications for material and color; as a result the company does very little recycling. In some cases, if the company locates a good batch of clean plastic, it will buy the quantity and store it until they have a specific type of order.*

**Partnerships:** Maxi-Plast works in partnership with Nima; the two owners share in the ownership and management of both companies (though officially, ownership is separate). Maxi-Plast started in 1996, and Danijela Djordjevic (Nima) helped to start the company; when Ms. Djordjevic started Nima in 2001, Mr. Maksimovic helped her in return. Both companies and owners now operate in full cooperation and partnership. Maxi-Plast also had one more partner in Gole Vode on plastic bottle production, but they are now ending that partnership and both operating independently.

**Recycling Opportunities:** Mr. Maksimovic mentioned an opportunity for increasing his use of recycled plastic in the production of small seedling and plant pots. They can use recycled plastic since color and material are not as important. Many nurseries, and even Serbia Shume, import these small pots. One producer in Leskovac is also producing the pots, but his equipment does not allow him to use recycled plastic. (His vacuum-based machines require uniform supply and plastic characteristics.) On the supply side, he indicated that LDPE from the Trajal corporation offered a large supply of recyclable material, but said that Trajal does not take enough care to keep the material clean and free of contamination; thus, recyclers are hesitant to use the LDPE because of the extra care and cleaning it requires.

## Serbian Recycling Association

7-24-09

**Overview:** The Serbian Recycling Association was formed mainly by Brzan Plast and remains closely connected to the company. The goals for forming the association were to 1) get recyclers organized so they can better cooperate and have opportunities to work toward common goals as a single body, and 2) to provide non-profit opportunities through access to public and international resources. The organization currently has about 50 members, and is led by Rade Simic (Brzan Plast) and Milan Ilic (Belgrade-based, President of Assembly).

**Initiatives:** The association has applied for and participated in several grants, including the Clean Up Serbia project, a 4M RSD project financing a public campaign (1.6 M RSD) and recycling equipment (2.4 M RSD) and a World Bank

project for training and seminars (this may be the same as mentioned). On the topic of study tours, Mr. Simic stated that he has traveled fairly extensively to see recycling in other countries; it was useful for him to see other programs, but Serbia needs to find its own way in the sector with practices and programs that work locally.

**Role of Serbia:** The Serbian Recycling Association raises the issue of the role of Serbia in EU recycling and if and whether Serbia can and should try to develop a larger role in the sector. Such a goal would require the coordinated efforts of national and local governments in partnership with the private sector, as well as significant investment. A more modest goal of meeting the EU guidelines (22.5% plastic, 60% paper, 60% glass) is achievable under a plan similar to that presented by Brzan Plast above.

**Challenges:** There are several challenges faced by the association: 1) members don't fully understand and perhaps expect too much for themselves from the association in terms of donations and assistance; 2) the association needs to increase its profile and visibility; 3) according to Mr. Simic, Brzan Plast bore extra expenses from the World Bank project in order to finish the project, and other members were unwilling to contribute.

**European Association for Recycling:** The Serbian Recycling Association is collectively a member of the European Association for Recycling, and has received good technical assistance and advice on collection methods and planning. Dues are reportedly €1700 - €2000 per year.

**Legislation:** Mr. Simic feels that the Serbian legal environment is not sufficient to support recycling, though said that he expected new legislation in 2010 to improve the situation. Recyclers all seem to support a practice of taxing packaging materials (especially plastic) to raise public funds to support recycling. Serbian recyclers in general

## Municipal & Public Programs

### JKP Krusevac

11-17-08

**Materials:** Mixed Plastic, Paper & Cardboard, Glass

**Quantity:** Krusevac JKP has collected approximately 150 tons of recyclable materials (paper, plastic and glass) since beginning a recycling program: 2006 – 50 tons; 2007 – 60 tons; 2008 – 32 tons to date, with expectation of 50 tons. For mixed plastic, they collect approximately 750 kg per month; the remainder, mostly paper and cardboard, is minimal.

**Municipal Collection:** Krusevac JKP started a recycling program in 2006 under their initiative. They began with 20 recycling containers, and USAID added an additional 72 later in 2006 through the CRDA program. The initial containers were the closed type with lids, separately marked and colored for paper, plastic and glass. JKP management stated that the program began well but activities diminished because of lack of funds. They are aware that increasing containers, media campaigns and other recycling activities will have a positive impact but other priorities leave recycling low on their list of priorities. They also indicate that they have no positive economic benefit from recycling, but rather the main benefit being reducing the landfill volume and extending the life of the current landfill (thereby delaying an inevitable large investment). They estimate that 5-10% of the total volume of waste gets recycled (though the higher figure seems optimistic).

**Perception:** JKP management is not optimistic about recycling, citing the lack of financial benefit for recycling, and its low ranking on their list of priorities. When asked what donors could do to help JKP with recycling activities, a number of non-recycling-related activities were mentioned: normal trash containers, trucks, cemetery, mechanization and a compactor for the landfill. They also stated that many citizens simply do not want recycling, and thus much of the



Wire containers like those in the top photo have much better separation than those of the solid variety like in the bottom photo, which tend to get used as general containers. Both of these photos were taken in Krusevac, which has both types. The specific wire containers shown here have a disadvantage in their inability to be picked up by the fleet of trucks and have to be unloaded manually. If currently unavailable on the market, a wire container that can be picked up by standard trucks should be designed.



money spent for the recycling containers is wasted. Aside from their sales of collected recyclables, they do not seem to practice any sort of public-private partnership despite what appears to be numerous opportunities with willing enterprises in Krusevac. They see few or no possibilities for recycling to be profitable. Several of the JKP workers were interviewed separately and they had a somewhat more positive view of recycling in the city than management.

**Prices:** Krusevac JKP sells their pressed PET to Sani-Plast for €150/ton (17 RSD/kg). (This was a historical figure and is likely before the economic crisis.) Paper is pressed and sold to Umka for 4.8 RSD/kg.

**Collection:** JKP picks up PET and cardboard twice weekly in a compactor truck also used for general trash on other days; it is transported back to their facilities where it is compacted and baled in 40-50 kg bales. They have five workers working with recyclables. While they indicated that they do require a total of 700 recycling containers to cover the entire city, their greater need is for normal (non-recycling) containers. It should be noted that JKP only covers villages close to Krusevac, and none of those villages with recycling activities. JKP has a strategic goal to expand trash collection throughout the municipality. Workers also mentioned problems with Roma taking cardboard from the paper containers; though they also agreed that anyway it was still being recycled and not ending up in the landfill.

**Opportunities:** Again, Krusevac JKP was not able to articulate many opportunities with recycling. When discussing expanding the recycling program, the “greater need” for general (non-recycling) containers was cited. One opportunity (cited by workers) was a washer and granulator for the plastic so that they could sell it for a higher price. (If granulating, obviously the plastic would need to be sorted as well.) Management also stated that the media can play a role in increasing recycling, but no specific initiatives were presented (though it should be noted that JKP Krusevac has financed recycling billboards throughout the city on several occasions). The most concrete suggestions were to i) construct a recycling center at the landfill where citizens can drop their recyclables, and ii) to implement a recycling program for appliances, electronic, and construction waste.

## Municipality Krusevac

11-11-08

**Future of Public Companies:** The municipal officials of Krusevac seem open and willing for cooperation in areas of improving public services, public-private partnerships and cooperation in general. Essentially, the municipality is trying to make the public companies, specifically JKP, self-reliant. At present, the municipality finances Krusevac JKP in the amount of €1.5 million per year, including 5 million RSD from the Ecology Fund for kenneling street dogs. The remainder of JKPs income is earned from their services – trash removal fees, winter snow clearing, funeral services, flower sales and other services. In the future, JKP and other public utility companies will be privatized. In addition, the municipality plans that the services currently provided by JKP will be subject to open tender; an example of this that they have already installed is maintenance of the city lighting, which was recently contracted to a private firm (resulting in better service at a lower cost).

**Ecology Fund:** The municipal ecology fund is regulated by law, stating that a portion of the municipal budget must be allocated for ecology. In Krusevac the Ecology Fund is used to support recycling and other activities; one such initiative was the cleaning of 200 wild trash dumps throughout the municipality.

**Landfill:** The Krusevac landfill is not a “wild” landfill, nor does it have legal status in compliance with international standards. The landfill lacks wastewater management, a secure boundary and gas collection. There was a project proposal from an Austrian firm to construct a legal regional landfill but political interests and conflicts prohibited it from proceeding.

## JKP & Municipality Raska

7-24-09

**Materials:** PET Bottles, paper (started and subsequently stopped collecting).

**Quantity:** Plastic: 1.0-1.5 tons/month, currently all stored. Paper: 15 tons total before stopping collection.

**Municipal Collection:** Raska municipality started its recycling program in 2007 following the USAID donation of 60 wire recycling containers and a 20-ton press. The Raska recycling program was among the best observed by Treehouse in terms of separation of waste, placement of containers, and usage by the public. The municipality, however, has yet to sell any of its baled plastic due to low prices, lack of contacts (they had not heard of Greentech), and availability of ample storage space to store the bales. The municipality did have an interesting innovation for their containers: the containers weren't appropriate for the trucks (a common issue in many municipalities), so they adapted the containers with large bags which can easily be managed by the current fleet. The municipality originally started collecting paper as well, but stopped after collecting an initial 15 tons due to problems with collection, storage and sale.



**Expanding Outreach:** All 60 containers are in use with some located in 3-4 nearby villages. To expand recycling, Mr. Kragovic stated that they would require more containers, equipment and workers. For village recycling, the municipality has discussed procuring an additional 60 containers for three nearby villages, or some larger containers that could serve an entire village and be emptied once per week.

**Citizen Separation:** The plastic recycling containers in Raska were among the best observed by Treehouse during the course of this assessment. Separation in all containers was excellent and the container placement was efficient, with most containers having roughly equal volume of contents. The municipality confirmed their positive experiences and satisfaction with the recycling program, attributing it to positive public perception, willingness of citizens to separate their waste, and media and school campaigns to kick start recycling program.

**Assets & Other Data:** Raska municipality has ten collection trucks, 60 wire recycling containers, and a 20-ton press. PET bales weigh 50-60 kg each, and a truck can carry 8-10 bales, or 400-600 kg/truck. Current pricing for unsold PET was indicated to be €150-€200/ton. Municipal staff indicated a need for a plastic shredder, though this opinion is not shared by Treehouse as discussed previously. It should be noted that Treehouse visited the city of Raska and inspected the recycling containers, but the interview was conducted via telephone due to the unavailability of municipal and JKP staff on the day visited.

**Public-Private Partnerships:** Raska municipality and JKP have no cooperation with the private sector related with recycling and waste management.



*Raska municipality partly solved the problem of adapting containers to their trucks by placing large bags inside the containers. The containers are then opened, the bag is lifted out and emptied, then replaced in the container. The containers in Raska showed excellent separation and seem to be placed efficiently around the city.*

## JKP, Zitoradja

7-30-08



*The container in the top photo on the outskirts of Zitoradja town illustrates the high level of citizen separation generally observed in containers in villages and small towns. Perhaps this is related to the number of illegal dumps in villages and citizens recognizing the problem. The bottom photo shows the USAID-donated press and bales of PET and cardboard. Though the municipality is small, it manages a diligent and expanding recycling program.*

**Materials:** PET Bottles, LDPE Bags, Cardboard

**Quantity:** Average PET bottles 1 ton/month, significantly higher in summer. In first two months of recycling collected 5-6 tons PET. Cardboard: 3 tons/month.

**Recycling Program:** The municipality of Zitoradja started recycling activities in cooperation with the USAID CRDA program implemented by Mercy Corps in southern Serbia. Prior to the program they had no recycling activities and credit the USAID initiative a great idea and initiative. The USAID grant provided 50 PET recycling containers, a compactor and a shredder; the municipality later procured an additional 70 containers. At the start of the program they implemented a media campaign to inform the public about the program, and sought collaboration with the Roma population. In the first two months they collected 5-6 tons of PET. While the municipality and city are small and the amount of collected waste is much lower than other municipalities, JKP and municipal officials see positive impact: i) JKP workers observe that there is 60-70% less PET in the normal containers, and ii) the street cleaners indicate the city is cleaner, indicating broader citizen awareness beyond simply recycling.

**PET Prices:** Greentech is currently buying compacted PET from Zitoradja for 16 RSD/kg. Other offers include: i) a local company working with nylon and hard plastic (perhaps Vlada-Pak) offered 8 RSD/kg; ii) Slovenian company for PET in unlimited quantities offered 10 RSD/kg; iii) Aleksandar Plus in Shabac offered 12 RSD/kg for unsorted and 13 RSD/kg for sorted plastic. Roma are reportedly paid 6-8 RSD/kg locally.

**Citizen Separation:** Treehouse staff members noted that the

municipalities of Zitoradja and Blace had perhaps the best separation of plastic in containers than any other city, much better than the larger city of Krusevac. In all recycling containers, PET and other plastic was totally separated from other trash, even in cases where recycling containers were placed alone. JKP verified this observation but noted that separation is better in the city than in the villages. JKP has also placed a special container for LDPE bags on a corner near shops and the shopkeepers and public are also separating their LDPE.

**Collection:** Zitoradja currently has 120 recycling containers, and collect in both the city and villages. In fact, they have very few normal trash containers in the villages (10-15 total for entire municipality), but rather only recycling containers. Some issues were reported where PET is periodically stolen from the containers, though with the current low price this is not happening of late; regardless, it is not necessarily a bad problem to have.

**Markets:** Zitoradja JKP presses their PET and sells it to Greentech. Though there are some potential local buyers, Greentech pays the highest price. Though they have a shredder, it appears they are not using it as they can get a better price for pressed. (This is logical, since they are not separating the plastic by type and color, and shredding all plastic waste together would lower its value or in the worst case, make it unusable for many markets.) Greentech has offered them a higher price for plastic separated by color but they have not done this; if they did, several local markets would be accessible (Vlada-Pak for one).

**Increasing Collection:** When asked about ideas to increase collection JKP mentioned the possibility of paying private collectors for PET, though in reality this is probably not likely. Related to Roma (500 individuals, 8-10% of municipality), they do some collection but with the prices low this is now minimal. Perhaps by hiring some Roma directly and paying them a salary and providing social benefits they would be willing to collect directly for JKP. Typically, transportation is perhaps the largest barrier, as the cost for transportation offsets the income from recycled plastic.

**Other Materials:** Zitoradja recycles cardboard but on a fairly low level (3 tons/month). Larger quantities of paper and cardboard are already recycled by the Roma, though this has diminished lately because of the lower price. They sell to Umka for 3 RSD/kg presently, down from 12-13 RSD/kg prior to the economic crisis. They also have demand for non-PET plastic but it seems that they are not separating it. Zitoradja does not collect glass, as they have no market for it.

**Actions:** Zitoradja municipality organized a river cleanup in November 2008, after a flood, where 18 workers cleaned 7-8 km along the Toplica River on the Kursumlija-Prokuplje road. Plastic was mainly collected at accumulation points where river flow stagnated. They collected 2-3 truckloads of plastic bottles; however, when pressed, it amounted to only 300-400 kg.

**Landfill:** Municipal officials reported that a new regional landfill with recycling collection center is slated for construction in Leskovac; 5-6 individuals would perhaps be hired to collect and separate recyclables in the landfill itself. An Austrian firm is said to be interested in a contract to collect and manage recyclables from the municipality and collection center.

## JKP Blace

1-23-09

**Materials:** Mixed Plastic, Cardboard

**Quantity:** 750 kg mixed plastic per month; cardboard minimal.

**Recycling Program:** Blace municipality started recycling activities in 2006 in cooperation with the USAID CRDA program implemented by Mercy Corps in southern Serbia; prior to the program they had no recycling activities. The USAID grant provided 50 recycling containers and a 40-ton press; JKP later purchased an additional 20 containers. The municipality organized a media campaign when activities started and report positive reaction from the public. They believe that 90% of the citizens in the municipality are now separating their plastic. Their program is unique in that they are also collect PET in the villages; furthermore, villages are not charged a monthly JKP fee so recycling is completely voluntary as there is no financial incentive for the villagers – they recognize waste disposal as a problem and are cooperating to address it.

**Collection:** As was the case in Zitoradja, Treehouse staff members noted that the containers in the municipality had excellent separation. JKP



*Blace has small wire plastic receptacles in and around the city. Again, the citizens in this small town seem to be willingly and diligently separating their plastic waste. Blace is unique in that they have containers placed in villages as well as the town.*

employs two workers for collection (not clear if this is for all trash or just recycling) and three workers who work once per week on the press. In the summer, there is more plastic so the press is operated more. Blace collects some cardboard but on a low level, selling it to "Papir Servis," a Roma firm in Prokuplje, who picks it up in Blace.

**Markets:** Blace JKP sells their pressed plastic to Greentech. They also indicated that the Aleksinac firm, Dementzia, also has offered to buy their plastic, but for only 0.15 RSD/kg. There is virtually no financial incentive for plastic recycling, with the primary benefit being reduced trash in the landfill.

**Landfill & Plans:** Blace representatives say that they have the only (or one of the only) landfills in Serbia that meets EU construction and operating standards. It is reportedly a licensed, clay-lined landfill with gas collection. There is a proposed project to add a collection and sorting center at the landfill (budget approved and company selected).

## Municipality Ivanjica

6-6-09

**Materials:** Paper, PET bottles (not currently ongoing)

**Municipal Collection:** It appears through discussions at the municipal level (JKP personnel were unavailable on the scheduled day) that municipal recycling in Ivanjica is limited. No public recycling containers were observed in the city and it appears that initial efforts were abandoned (though limited details were available). Reportedly, JKP placed the 50 recycling containers donated by USAID in the city, and collected and baled some plastic and paper (press was also donated). No details were available related to quantities, markets, and current initiatives. The impression by officials was that the containers were not used properly by citizens, and perhaps selling the collected recyclables was not cost-effective. Some school-based recycling initiatives appear to have been undertaken, but details regarding the programs and outcomes were not presented.

**Private Collection:** A private recycler, SZR Milanovic, is undertaking public recycling in the municipality. The company was given permission by the Ivanjica municipality to place their own containers in selected locations in the city. Milanovic apparently procured some pressed cardboard from Ivanjica JKP, but on trading the material found that it was poorly separated and contaminated, causing him some difficulties with his buyer. Aside from that and a stated possibility of collaborating with Milanovic to remove metal and abandoned vehicles from the municipality, there is minimal interaction between the private enterprise and public institutions. SZR Milanovic is presented in more detail in the Private Sector Company Profiles section.

**Containers:** The municipal recycling containers were of the closed-lid, plastic variety in separate colors for paper, plastic and glass. Citizens are typically less diligent in separating recyclables in these containers than in the wire bins, which may partially explain the perceived lack of success in the municipal program. The private recycler, Milanovic, uses wire bins; his containers were observed around the city and had good separation.

**Future Plans:** The future plans of the municipality are vague, though they view recycling as a possible solution to limited landfill space. They are planning a regional landfill with a recycling center and transfer station and would like to initiate a program and provide space for citizens to separate. As yet, they have no specific details, aside from hoping to address recycling of batteries, tires, glass and other waste in addition to paper, plastic and metal. Construction of the regional landfill is expected to begin in 2010, leaving another year to develop and implement a program. The municipality indicated that progress was made with respect to minimizing wood waste through the USAID donation of briquette machines.

## JKP & Municipality Priboj

6-7-09

**Materials:** Minimal collection or recycling initiatives ongoing. Started collecting paper, plastic and aluminum after USAID donation but essentially discontinued at present. No glass collection was attempted.

**Quantity:** Priboj JKP collected enough recyclables of all kinds to fill eight trucks, totaling 20 tons, for which they received €1000. Though the quantities are small, they still consider it a small success. All materials were sold to Novak (see profile).

**Municipal Collection:** The Priboj municipality and JKP do not have a municipal recycling or collection program despite receiving a USAID donation of a press and 21 large containers (the same donation as for Nova Varos). They started the recycling program with a small media campaign to inform citizens and encourage them to recycle. The municipal and JKP representatives interviewed cited the problems with citizens separating waste, a lack of support by some actors in the local government, and low prices for recyclables. Recently, JKP tried to target companies and industrial recyclables, offering to take their recyclable waste; only three companies responded. They feel that recycling is still a good idea, but



the priority now seems to be on a regional landfill, which was started in 2006 with support from numerous donors; a tender for private management of the landfill is expected.

**Related Initiatives:** The municipality is hoping to prepare a joint project focusing on the Lim River with Montenegro under the EC Neighborhood Program tender. They also reported that initiatives are sometimes undertaken to collect PET bottles from the lakes, though these initiatives largely ignore the larger issue of the existing landfills' close proximity to the rivers and streams.

## JKP Nova Varos

6-7-09

**Materials:** No collection or recycling initiatives ongoing.

**Municipal Collection:** The Nova Varos municipality and JKP do not have a municipal recycling or collection program despite receiving a USAID donation of a press and 20 large 5m<sup>3</sup> compartmentalized containers. They cite several reasons for not implementing the recycling program as planned: i) they only have one truck which is committed full-time for regular trash pickup; ii) space was never made available for operating the press and storing recyclable materials; iii) internal politics and the perceived unwillingness of the general population to separate materials; and iv) insufficient staffing and resource levels, citing Nova Varos JKP as among the lowest in Serbia in terms of resources, with only 21 employees excluding Vodavod (water).

**Private Collection:** According to Mr. Miroslavljevic there are no private recycling ventures that collect PET or paper in the municipality, though this was not confirmed, and he further said there was/is an offer from a private collector to buy paper if JKP collects it.

**Containers:** The recycling containers donated by USAID are unique and not quite convenient for use. They are large 5 m<sup>3</sup> containers with three separate compartments and sections of lids that only allow a certain type of waste to be deposited. The main disadvantage is that when they are emptied all of the recyclables are combined. The design was actually specified by the Priboj municipality and then copied by Nova Varos; both submitted the request to the USAID program. Nova Varos has 20 of the containers and plan to place ten of them around the city, and then put the remaining ten in rotation as full ones are picked up.

**Future Plans:** A second lift truck has been budgeted by the municipality to help solve the problem with trash pickup and recycling. Mr. Miroslavljevic said that the donated containers will be put in service within 15 days to collect plastic and paper (despite two years going by since the donation was made). To help the recycling effort, the municipality plans to make use of temporary labor (26 people for six months) subsidized by the national government through the Public Works program to help manually sort recyclables. They expect to locate a PET buyer in Cacak to purchase the bales. They plan to target shops to collect cardboard and use the municipal inspection system to enforce recycling; a noted challenge is because of the small size of the city inspectors are typically unwilling to fine a friend or acquaintance.

**Related Initiatives:** The nearest landfill for Nova Varos is located 20 km away in Priboj. A regional landfill aimed at serving Nova Varos, Sjenica, Priboj and Prijepolje was reportedly started two years ago near the existing landfill, but construction stopped around the end of 2008; no further information was provided. The municipality is also trying to apply for a "Clean Serbia" project to clean up some of the worst of 72 illegal dumps. Some school education campaigns were also completed, though no details were provided.

## JKP & Municipality Tutin

6-8-09

**Materials:** No collection or recycling initiatives ongoing or initiated.

**JKP Privatization:** The Tutin JKP was privatized nearly three years ago; according to them, they were the first in Serbia to privatize. "JKP" is now managed by Filman DOO who has a 15-year contract to manage communal services. The arrangement basically is a rental, whereby Filman rents most of the former JKP equipment from the municipality and is paid to provide management. Filman also utilizes some of its own assets, including their facility, a press and a co-owned truck. Privatization reportedly followed multiple changes of JKP directors by the previous municipal administration, none of which improved the situation; followed by placing JKP under Urban Planning (Direksija za Urbanism); and finally the current agreement (which was originally 25 years but later reduced on agreement by both parties to 15 years). Cooperation between Filman and the municipality is reported as good.

**Recycling:** The municipality of Tutin received a donation of a press and 50 containers from USAID in 2007 but has yet to start a recycling program. According to the interviewees, Tutin wants to recycle but needs a push forward through assistance, credit or other source. Reasons cited for not starting a recycling program include: 1) lack of sufficient space



to manage recyclables, 2) low municipal priority in comparison with other needs, and 3) cost-effectiveness of recycling. Filman would like to get an agreement with the municipality to shred, rather than press and bale, plastic but this may not be realistic given the small quantities that might be expected in Tutin. Since they apparently have a truck shortage they would expect to follow the practice of picking up full containers and leaving empties; large containers could be placed in villages, one per village, and picked up once per week; Tutin has 100 regular steel containers. Representatives surveyed said that a holistic approach is needed, addressing logistics and citizen education. The only private sector recycling initiative noted in Tutin was metal, collected by Roma and other citizens.

**Donor Assistance:** Tutin municipality has been the target of two large programs since 2001 that have provided substantial infrastructure improvement to the municipality – the USAID CRDA program and UNDP PRO. USAID invested considerable resources in direct infrastructure projects, most recently focusing on upgrading electricity transmission. UNDP also completed some projects, as well as developing technical documentation for water and other projects, which Tutin can use in the future to attract new donor investment. GTZ tried to facilitate recycling through proposed investment in a truck and press, but the municipality was unable to deliver the matching contribution; some discussions of a recycling center may have also taken place. There is reportedly a plan for a regional depot with Raska and Novi Pazar, and the municipality developed a plan for removing illegal landfills in 93 villages and cleaning some river sites. There was also a proposal for a joint project related to river pollution of the Ibar, but some problems in Kosovo Mitrovica prevented it from being implemented.

**Priorities:** Interviewees stated that recycling ranks low in priorities compared with infrastructure projects, namely water, sewage and roads; while the municipal budget was cut 30%.

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