U.S. TRADE AND DEVELOPMENT AGENCY

EXECUTIVE SUMMARY

FEASIBILITY STUDY FOR THE CELJE WASTEWATER TREATMENT PLANT AND MUNICIPAL SOLID WASTE FACILITY

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U.S. Firm: Armentrout Roebuck Matheny
Main contact name: David M. Roebuck
Current phone: 706-548-8211
Fax: 706-548-1814

Project Sponsor: Municipality of Celje
Main contact name: Ivan Pfeifer
Current phone: 386-63-438-911
Fax: 386-63-441-800

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1. EXECUTIVE SUMMARY

INTRODUCTION

The city of Ce1je is located in central Slovenia and has a population of approximately 60,000 citizens. Ce1je is the third largest city in Slovenia and is actively engaged 'in planning to comply with European Union environmental standards. Like most cities Ce1je plans to manage solid waste, industrial waste, and wastewater in an environmentally acceptable, technically feasible, and cost-effective manner. The city of Ce1je expressed interest to the United States Trade and Development Agency (USTDA) who subsequently funded this feasibility study to recommend the most viable wastewater treatment and solid waste management options for the city.

Solid waste collection includes collection of residential and commercial wastes. Recycling includes pick up of waste paper from drop off bins located throughout the City. The recycled paper is transported to a recycling facility. The City owns a solid waste landfill that is located about 3 kilometers from the city center. The existing landfill is unlined and does not meet EU standards. However, a new lined area, adjacent to the existing unlined landfill has been constructed and plans are to expand the lined landfill to accommodate waste from future years.

EXISTING CONDITIONS- SOLID WASTE

The service area for the BukovzIak sanitary landfill includes the Ce1je region. The region includes the following communities: Municipality of Ce1je, Voinik, Store, Dobma, Sentjur, Zalec, Polzela, Prebold, Vransko, Tabor, Braslovce, and Mozille. The estimated number of the inhabitants of the above-mentioned twelve communities is around 124,000. However, presently only about I 10,000 residents utilize the landfill services. The remaining 14,000 inhabitants, most likely, live in rural farn-fing communities and either are not major waste generators or engage in on-site waste disposal. Future plans are to ensure no illegal dumping occurs and all solid waste is transported to a permitted recycling or disposal facility.

Javne Naprave, javno podJetie, d.o.o., is a firm that is owned by the City of Ce1je and is responsible for collection and disposal of solid waste. Javne Naprave maintains a solid waste collection fleet for collection of residential and commercial waste. Presently, all recycling activities are contracted out to a private company. The City owns the Bukovzlak landfill.

MUNICIPAL SOLID WASTE COLLECTION SYSTEM

Residential waste includes waste from single as well as multi-family dwellings. Ce1je region's

Type of Residence	Number	Percent
Single family Homes	29,000	63%
Flats or Apartments (1)	17,000	37%
Total	**46,000**	

Typically, the composition of the waste stream from each of the above-mentioned sources varies. The largest variable is the garden waste. Single-family homes can generate large quantities of green or garden waste, whereas multi-family homes and apartments generate negligible or little garden type wastes.

Javne Naprave's fleet of residential collection vehicles operates six days a week and picks up the residential waste from the curb. Single-family homes are provided with 240 liter or one 50-gallon container by Javne Naprave to deposit the solid waste that is collected on a weekly basis.

Apartment buildings are provided with 3 cubic yard containers or larger roll-off bins to deposit their solid waste.

Ce1je has a mandatory residential collection program that means that the residents must use the Javne Naprave services and are-billed for solid waste collection and disposal services on a monthly basis. Presently, only a very small minority of residences located in rural areas is not on the mandatory collection program.

Commercial waste includes waste from sources such as shopping malls, office buildings, schools, institutions, and restaurants. Depending on waste generation rates Javne Naprave provides the individual commercial establishments with the necessary are provided a 50-gallon, 80-gallon, or a roll-off bin. Based on agreements with the *individual customers the bins are emptied into collection vehicles at least once per week.

Industrial waste consists mostly of non-hazardous demolition and construction type wastes. Typically, industrial waste is generated from construction sites or remodeling of homes or other infrastructure projects. Industrial waste could also 'include sludge generated from a municipal wastewater treatment plant.

Most industrial is hauled directly by the waste generators to the Bukovzlak landfill.

The waste stream is estimated by Javne Naprave to be as follows:

Residential: 50% (Includes all single and multi family homes)
Commercial: 10% (Includes offices, schools, library, museum, hospital, etc.)
Industrial: 40% (Includes shopping, trade/craft, construction, sludge, soil)

SOLID WASTE MANAGEMENT OPTIONS

There are essentially four major solid waste management options available for Celie and are delineated as follows:

1. Residential and Commercial Recycling Programs
2, Green Waste Composting Program
3. Regional Solid Waste Combustion Facility
4. Expansion of Bukovzlak Landfill

Implementation of several options will be necessary to comply with the new regulations. EU requires that each city recycle a minimum of 25% of its waste stream. Implementation of a combination of the above mentioned options will assist the City 'in meeting all Slovenian and EU standards for solid waste disposal.

ESTIMATED COSTS FOR IMPLEMENTATION OF PROGRAMS

It is important to note that table ES I only reflects costs for implementing new programs to meet the stringent environmental standards. The overall solid waste management costs are obviously much

PROGRAM	Cost (Year 2000 $US)	Cost*(Year 2000 SYI)
Capital Costs for a Residential Recycling Facility	4,600,000	862,270,000
Capital Costs for a Green Waste Composting Facility	3,500,000	656,075,000
Capital Costs for Expansion of the Bukovzlak Landfill	8,600,000	1,612,070,000
TOTAL ESTIMATED CAPITAL COSTS	**$16,700,000**	**3,130,415,000**
Operations and Maintenance Costs for a Recycling Program	508,200	95,262,090
Operations and Maintenance Costs for Green Waste Composting	243,900	45,719,055
Operations and Maintenance costs for the Landfill Expansion	1,207,900	226,420,855
TOTAL ANNUAL O&M COSTS	**$1,960,000**	**367,402,000**

* Conversion rate as of 1/7/00 $ 1 US= 187.45

Table ESI: Estimated costs for EU regulatory program compliance

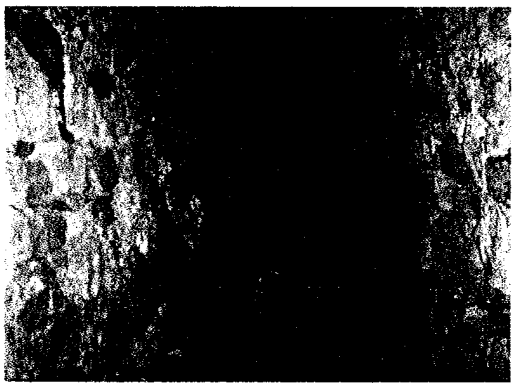
INCREMENTAL TIPPING FEE

Assume that the $16.7 million (SIT 3,130,415,000) capital costs can be financed over 10 years at at, interest rate of 6%. Therefore, the annual amortization rate will be about $2,269,500 (SIT 425,417,775). The sum of the annual amortization and the respective O&M for the three new programs is estimated at $4,229,500 (SIT 792,819,775).

Based on an annual tonnage of 51,735 solid waste disposed at the landfill and a new cost of $4,229,500 the incremental per ton tipping fee will be $82 (SIT 15,320.90) per ton. This is a substantial increase in fees. Based on 0.47 tons generated per capita could result in an annual fee increment of $39 per person. Assuming an average household with 3 people generates 0.47 x 3 = 1.41 tons of solid waste per year. Therefore, the incremental cost to this household will be $82 x 1.41 tons = $116 per year or about $10 (SIT 1,874.50) per month.

EXISTING CONDITIONS- WASTEWATER

The municipality of Ce1je has in place an extensive wastewater collection system as well as a comprehensive future plan for extensions and improvements to the system. Like many old cities in Europe, Ce1je's collection system is a combined system since storm water and wastewater are transported through the same pipe system. Combined sewer overflow structures were constructed to control the amount of storm water that will be sent to the proposed treatment facility. Currently, discharge of untreated wastewater from the combined system occurs at the Savinja and the Vog1jana Rivers.



Existing Roman Era-sewer near Savinja River

PROPOSED TREATMENT FACILITY

The municipality of Ce1je has obtained a parcel of land along the Savinja River near the village of Lasko. The property is bordered by steep mountainous terrain on one side, a railroad on the other side and the river to the south. The property is adequate for construction of the wastewater treatment plant but does not provide room for future expansion. Ce1je has indicated that property across the river may be available for future expansion although it is not now within the City's control.

Slovenia and current European Union standards are nearly synonymous (although some limits of Slovenia are slightly more restrictive).

This study analyzed the proposed Cyclic Activated Sludge Technology (CAST) plant as recommended by IEL This process was commented upon as follows:

1. No cleaning of fire screen
2. No means of removing sludge from primary settlement tank
3. Recommend that coagulant addition be made prior to primary and secondary settling
4. Observed that SBR type processes such as CAST is generally not used for plants of the size of Ce1je's proposed plant.
5. Observed that proposed plant may be difficult to operate
6. Stated that control of CAST process is only as accurate as field *instruments, pH monitors, DO probes, turbidity meters, etc
7. Observed that anaerobic depositor can be a source of odor
8. Recommended that emergency power be provided
9. Influent flow measurement into the plant was not addressed. A Parshall flume is recommended at the headworks.

The study also contains evaluations of alternative processes based on equipment seen by members of the CelJe delegation during their trip to the United States. The following processes were studied:
1. Conventional Activated Sludge (estimated project cost SIT 5,212,135,351)
2. Orbel (US Filter/Envirex) system (estimated project cost SIT 4,186,768,740)
3. Schreiber system (Estimated project cost SIT 4,601,158,947)

Operations and Maintenance costs for the proposed wastewater treatment plant was calculated to be approximately $1,503,000/SIT 281,737,350 or $142/100 M3 treated (SIT 26,617.90/1000 M3 treated).

II. INTRODUCTION

The Republic of Slovenia is located southeast of Austria and was formerly a part of the Federal Republic of Yugoslavia. Slovenia signed an association agreement with the European Union (EU) on October 6, 1996. Presently, the Slovenian government is moving forward with the planning to become a full EU member by the year 2002. However, conforming to EU environmental standards is one of the pre-conditions for full EU membership.

The Slovenian national government as well as local governments are cognizant of the importance of meeting environmental standards and enacted the Environmental Protection Act (EPA) 'in 1993. This act is the main body of legislation that establishes environmental policy and management. The EPA is based on the environmental directives of EU's Agenda 21 and addresses issues related to municipal and industrial discharges 'in the nations air, water, and on land.

The city of CelJe is located 'in central Slovenia and has a population of approximately 60,000 citizens. Ce1je is the third largest city In Slovenia and is actively engaged in the planning and implementation of environmental initiatives necessary to comply with the EU standards. Ce1je plans to manage its solid waste, industrial waste, and the existing wastewater in an environmentally acceptable, technically feasible, and cost-effective manner. As a step towardmeeting these goals, the city of Ce1je investigated the sources of international funding that could be used for evaluation and confirmation of existing planning. The funding was also sought as a

means to obtain objective, technical alternatives to the various project approaches under consideration. The United States Trade and Development Agency (USTDA) was contacted and agreed to provide funding for this effort. A grant agreement between USTDA and Ce1je was signed on September 18, 1998.

According to the updated study by IEI, at present there are approximately 57,850 customers served by the waterworks system. Consumption of water in residences has decreased from a total of approximately 4,400,000 m' in 1991 to approximately 3,300,000 M3 in 1996 and 1997. Consumption of water by 'industries has also dropped sharply during the same time period and is estimated to have decreased by approximately 50%.

Solid waste collection 'includes collection of residential and commercial wastes. Recycling includes pick up of waste paper from drop off bins located throughout the City. The recycled paper is transported to a recycling facility. The City owns a solid waste landfill that is located approximately three kilometers from the city center. The majority of the existing landfill is unlined and does not meet EU standards. However, a new lined area, adjacent to the existing unlined landfill has been constructed and plans are to expand the lined landfill to accommodate waste from future years Figure 6 is an aerial photo of the existing landfill showing current and future disposal areas.

Ce1je has received a proposal from an Austrian firm to develop and implement a green waste composting facility adjacent to the landfill. Presently, Ce1je is considering adding a composting facility, however, has deferred any decisions till this feasibility study is finalized.

M. CELJE REGION POPULATION AND GROWTH FACTORS

The City of Ce1je is surrounded by numerous smaller towns and villages that increase the regional population to approximate 110,000 persons. Local planning authorities suggest that no significant population growth is expected nationally or at the Ce1je regional level.

Solid waste generation rates are directly related to the population. Therefore, future solid waste tonnages will be directly linked to the Ce1je population. For purposes of this report and specifically for plant sizing and capacity determination a negligible population growth has been recommended. To maintain a conservative approach, we have assumed a 0.5% population growth per year has been used for projection calculations.

According to the information included below, the population of Ce1je is 49,381 citizens. As of March 1999 the sewer network for Ce1je serves 41,727 of these citizens. This number 'includes 39,058 residents from the Municipality of Ce1je, with the remainder from outlying villages (see Tables I & 2).

Community	Number of supplied citizens
Ce1je	41,727
Levec	300
Total Approximate:	42,000

Source: 1E1 Report

Table 1: Existing sewer customers

Community	Number of supplied citizens
CeIje	49,000
Vojnik	4,016
Store	3,000
Sentjur	1,600
Zalec	232
Total:	57,848

Source: Institute of Public Health Celje

Date of Data: 9.25.95

Table 2: Citizens in CeIje supplied with drinking water by city

From Table 2, it is noted that the number of water customers as of May 1998 for the Celje network, which includes Vojnik, Sentjur, Zalski, and Store consists of a total of 57,848 persons.

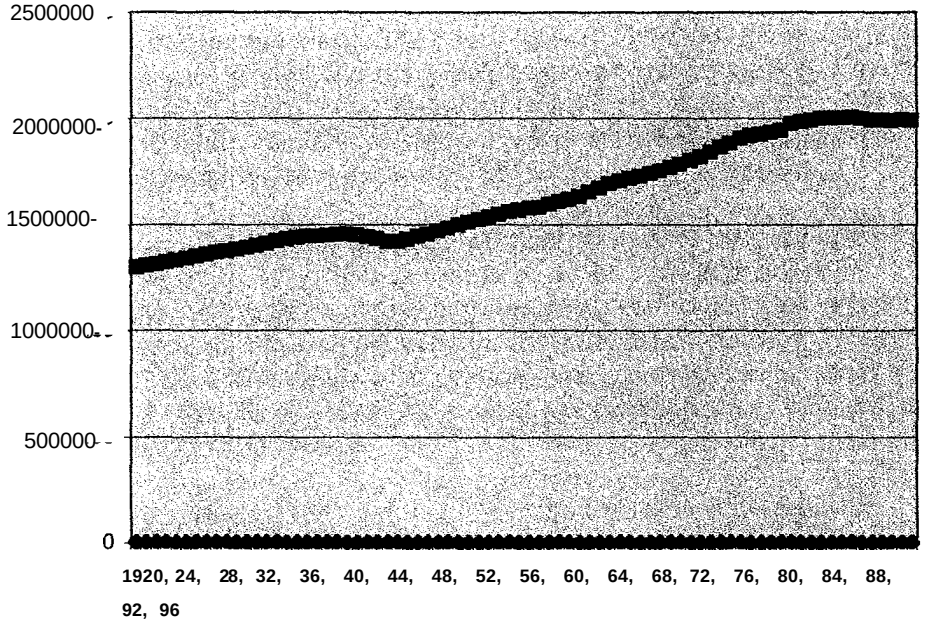
The anticipated number of persons to be served by the wastewater system is approximately 53,200 according to IEI (see Table 3) and includes Levec and Dresinja vas area along with Store and Vojnik municipal areas.

As a whole, Slovenia has approximately 2,000,000 citizens. The projected growth for the population is minimal through the year 2020 according to the Republic of Slovenia Bureau of Statistics. Chart I illustrates the projected growth rate for the nation as a whole.

Community	Projected number of supplied citizens
Municipality of CeIje	46,468
Levec and DresinJavas	725
Store and Vojnik	6,000
Total:	53,193

Source: lEI Report

Table 3: Projected number of wastewater



Source: Republic of Slovenia Bureau of

Chart 1: The Growth of Slovenian Population

In Ce1je the water and sewer flow rates rose at a moderate rate up until the year 1991. At that time the change of government and the resulting restructuring of the economy caused in large part by the breakdown of traditional trading partners created a significant decrease in industrial water and sewage usage.

IV. REGIONAL ECONOMIC CONDITIONS

Ce1je is a medium sized city located in cast central Slovenia. The economic recovery in the EU continues to promote favorable macroeconomic developments in Slovenia. In particular, strong EU demand for Slovenian exports generated higher than expected GDP growth in 1997 and in the first quarter of 1998. In contrast to foreign demand, domestic demand remained relatively subdued, mainly as a result of lower wage growth. As the current acceleration of growth is largely due to external developments; it does not take away the need for domestic reforms, such as bringing the public finances back into balance, speeding up enterprise and financial sector restructuring, and making progress with the privatization of state-owned enterprises.

GDP growth was revised upwards for the first three-quarters of 1997, leading to higher than expected GDP growth of 3.8% over the whole year. Preliminary data for the first quarter of 1998 are unexpectedly good; year-on-year growth is estimated to be 6.5%. The new data alter earlier, gloomier, assessments of economic developments in Slovenia. While previous GDP figures showed a stagnation of economic growth, the growth has been gradually accelerating since the second half of 1996. Foreign demand has been the driving force, while growth in domestic

demand was less buoyant than previously. In particular, household consumption increased less

than in previous years, mainly as a result of lower wage increases. Investment and government consumption, on the other hand, recorded substantial real growth rates in 1997.

In. 1997, economic growth was fairly evenly spread across sub-sectors in 'industry and services. The highest growth was recorded in electricity, gas and water supply (6.1%) construction (5.6%), public administration (4.80/o), manufacturing (4.81/o), and transport, storage and communications (4.61/o). The substantial increase of value added in manufacturing is remarkable, given the feeble increase of production volumes by only 0.2%.

Despite the relatively subdued domestic demand, growth of real imports of goods and services accelerated to close to 10%, as a consequence of the high import content of Slovenian exports. The fast growth of exports and imports continued also in the first months of 1998. Because exports grew somewhat faster than imports, the trade deficit declined slightly from 4.7% of GDP in 1996 to 4.3% 'in 1997. Similarly to previous years, the surplus on the services account offset a substantial part of the trade deficit. As a result, the current account remained positive and close to balance, like in 1995 and 1996.

Inflation developments in 1997 and 'in the first half of 1998 have been largely determined by the adjustment of administered prices. In 1997, prices of regulated products and services increased by 16.5%, contributing 4.5 percentage points to the 9.4% inflation rate (measured with the retail price index). In particular, energy prices increased by more than 20%, and thus accounted for about one third of total inflation. The authorities also liberalized a number of previously administered prices, such as urban passenger transport, some types of bread and some municipal utility services. Despite these significant price adjustments, the average growth of the consumer price index (CPI) over the whole year decreased further from 9.9% in 1996 to 8.4% in 1997. Continued price adjustments in 1998 have pushed up the average yearly inflation rate to 8.9% in the first six months, compared to 7.9% in the same period of 1997. Goods whose prices are still under government control now represent 17% of the CRI basket, compared to 2 1 % at the end of 1997.

Whilst in previous years, excessive pay raises had been an important source of inflation, and one of the factors that negatively affected employment, average real wages per employee increased by only 2.4% in 1997 (compared to 5.1% 'in 1996). As a consequence, real wage growth was substantially lower than the 3.8% growth in labor productivity. This trend continued 'in the first months of 1998. Despite the slow-down in real unit labor costs, the unemployment rate remain the same as in 1997. Unemployment is increasingly becoming a structural problem, because the majority of the registered unemployed are more than 40 years old, have a low level of education and have been without a job for more than a year. Nevertheless, the continuous decline of total employment now seems to have been arrested.