EXECUTIVE SUMMARY

Global Services & Solutions Inc. (GSS) is an environmental solutions and renewable energy organization with a strong vision for socially responsible, safe, and cost-effective solutions. GSS intends to carry out R&D work on a number of projects ranging from solid waste management to renewable energy and auto engine efficiency. Presently GSS is working on a Pilot Project to demonstrate the advantages of GSS TOTAL RECYCLING MANAGEMENT (GSSTRM). This waste management strategy offers a unique opportunity for maximum material and renewable energy recovery in a more cost-effective way. First GSS Total Recycling Management Center (GSS, TRMC) as the model project will be started in a small city with populations of 20,000 to 40,000. Estimated capital cost of the pilot project would be roughly ten million dollars (plus or minus depending upon the size of population). Afterwards, the cost of the same size new project will drop to about one third, and the payback time would be less than five years. Following is a brief description of the salient features and scope of the project.

The importance of recycling cannot be over emphasized, considering the stress already placed upon natural resources, in addition to the pollution problems. As the world population is increasing at a rapid rate and natural resources are becoming scarcer, total recycling has become absolutely indispensible. According to experts on the subject, if everybody in the world demands the same standard of living as we have in the United States, we would need four planets of the size of earth. It is high time that we start total recycling which is already overdue. Recycling saves energy and reduces green house gases. It is not easy to get a fairly accurate estimate of energy savings due to recycling, but significant savings to the tune of billions of dollars are possible. Similarly, the corresponding reduction in GHG emission would be significant. The energy spent in recycling operations would be mostly renewable (solar and wind), and so the net fossil based energy use would be less than 5%. GSS Total Recycling Management (GSS-TRM) can help achieve a recycling rate of 90% plus, ensuring the best possible quality of recyclables and, hence, the best cash value. It has the potential to help expand the volume of the recycling industry to half a trillion dollars, creating new business opportunities and jobs. The size of the recycling industry can even reach close to a trillion dollars, if Total Recycling Management Centers (TRMCs) also start developing renewable energy from wastes and renewable resources. More than 10% of national demand of energy can be substituted with renewable energy, developed by TRMCs.

GSS Total Recycling Management starts at the source of waste generation - that is in homes, offices, restaurants, hotels, etc. Presently our homes lack suitable arrangements for storing recyclables before discarding to city bins for collection by city waste collection trucks. Waste Organizing Cabinet (patent # 6,209,978) can fulfill the dire need of appropriate recycling equipment, for use in homes, and is convenient to use. Home owners can wash empty containers with hot water before discarding to the respective basket of Waste Organizing Cabinet. Separation of recyclables at the source of waste generation is important to improve the quality. Our present practice of dumping plastic, aluminum cans and glass in one part of a blue bin does not ensure desirable quality of recyclables for better commercial value. Nobody would be interested in spending two dollars to refine or purify something that can be sold for only one dollar. So, we should not let the recyclables contaminate in

the first place and lose their commercial value. It drives away customers and eventually sorted recyclables find their way to the landfill areas.

Newer kind of energy-efficient waste collection trucks will be introduced to separately collect each conventional recyclable, including both garden and kitchen refuse. At the Total Recycling Management Center (TRC) different kinds of plastics will be sorted and crushed individually. Similarly all other already segregated conventional recyclables will be further separated as per color, etc. and compacted or crushed, if needed, for sale in an appropriate way. Each recycling center TRC will run an anaerobic digester to produce methane gas, from biodegradable organic waste that cannot be used for any other better use like ethanol/methanol production or for thermal depolymerization (TDP Process) or p-series fuels, etc. This category of waste is mainly the kitchen refuse and some parts of garden waste.

Similarly every TRC will run a composite Waste Fire Logs (WFL) production plant. Since wood cannot be anaerobically digested, woody waste along with the waste paper and cardboard that is not fit for recycling can go into composite waste fire logs. WFL production plants will be semi-automatic and will use only renewable sources of energy. Solar heaters and super heaters, using fresnel lenses and reflective troughs, will be used for pulp cooking. High torque vertical axis windmills (patent pending) would be the prime mover for disintegrators, mixers, conveyers, extruders, etc. This would be better done by compressed air, stored by vertical axis windmills. Modified cheap starches and petroleum wax may be added if needed in some cases as binding agents. Cost per waste log should range between 1 to 15 cents and should not exceed 25 cents. Waste fire logs can be used by electric power production plants and for residential fireplaces.

GSS Recycling Management centers (TRCs) may have small electric power generation plants, running on GSS Gesowintegration® Technology. The electricity produced can be sold to the grid, and it would be an additional source of revenue. Similarly TRMCs can operate Thermal Depolymerization Plants (TDP), on renewable energy sources only, to produce gaseous and liquid fuels from wastes, for additional income.

ADVANTAGES OF COMBINING WASTE DERIVED AND NATURAL RENEWABLE ENERGY VENTURES WITH SOLID WASTE MANAGEMENT

One may question, why add to the complexity of solid waste management ventures which are already too complex, and whereas there are many different kinds of waste treatment and waste derived energy projects are going on? GSS Total Recycling Management will be streamlined and extremely convenient for citizens. We can surpass the Swiss recycling rate of 76% without any inconvenience to citizens. Secondly, when we look at the economic viability and success rate of renewable energy projects, we find that the existence of many renewable energy projects heavily depends upon governmental (federal and states) subsidies. For example, ethanol production from corn consumes more fossil energy than the renewable energy in the ethanol, in the ratio of 1.6 to 1.0. We, at GSS, are not against such ventures as they reduce dependence on imported oil and create jobs. Similarly, anaerobic digestion and thermal depolymerization (TDP) ventures don't succeed because of low yields and high costs of production. We definitely need to focus our attention to bring down the production cost to make them economically viable without any kind of subsidy. GSS waste processing units will be better equipped to manage the low cost of production because of three advantages. First, the selection of best yield/recovery wastes from all streams of decomposable wastes, for a particular renewable fuel. Second, GSS intends to use renewable energy to produce

renewable fuels. Third, the tipping cost at landfill areas is about 35 dollars per ton. It means that if we divert one million tons of decomposable waste to renewable fuels production, we will also save about 35 million dollars. Presently, our recycling rate is 33% and it includes composting. Bacteria involved in the composting process consume oxygen (O_2) and produce carbon dioxide (CO_2) gas and heat that is lost to the environment. Whereas, anaerobic digestion takes place in the absence of oxygen (air) in a closed system and less amount of carbon dioxide (CO_2) gas is produced. In addition, to that it is a net energy producing process that produces methane (CH_4) gas and digested slurry, which is an organic fertilizer plus soil conditioner. It can also help to bring down the cost of organic produce, which are very expensive right now.

Main sources of revenue would be the sale of recyclables, viz. aluminum, plastic, glass, paper, metals (iron, copper, etc.). Similarly, there would be other additional significant streams of income as follows:

1. Income from sales of Composite Waste fire Logs
2. Income from sale of Biogas (methane gas), from anaerobic digester.
3. Income from sales of digested slurry, from Biogas plant, as a valuable organic fertilizer with almost all macro and micro nutrients, (better than conventional anaerobic digesters)
4. Income from electric power sale to the grid, if the TRMC chooses to run a small power generation plant, based on GSS GESOWINTEGRATION® technology. TRMCs can use its own biogas and waste logs (CWFL), as well.
5. Income from operating a TDP plant, if a TRMC decides to run one, to convert waste to energy, using renewable resources of energy.

ADVANTAGES OF GSS TOTAL RECYCLING MANAGEMENT®

In addition to the obvious environmental benefits of conserving valuable natural resources, reducing green house gas emissions, savings in energy, and preventing many more serious environmental problems, the social and economic benefits are also significant. These can be summarized as follows:

1. Total Recycling Managements will stop waste of money on landfill areas
2. It will help cities to considerably reduce the cost of solid waste management. The savings can be passed on to the residents in the form of a slight decrease in the ever increasing burden of taxes.
3. It can help increase the volume of recycling industry to half a trillion dollars, creating a good number of new lucrative business opportunities and good paying jobs. The size of the industry can even reach a trillion dollars, if recycling centers also start developing renewable energy resources, partly based on wastes and partly based on wind, geothermal, and solar energy resources.