



*We Care For Our Environment*

## **Executive Summary**

Global Services & Solutions (GSS) is an environmental solutions and renewable energy organization with a strong vision for better, 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 renewable energy project that will produce integrated systems of renewable energy to cater to the energy needs of various kinds of buildings and industries. It can be further developed to encompass utility scale power generation and surface transport engines.

The reserves of fossil energy are depleting rapidly. Coupled with the growing awareness of associated environmental concerns, the pursuit of alternative renewable energy solutions is gaining momentum. However, many solutions in the renewable energy field are extravagant. Their survival depends heavily on governmental subsidies and to some extent on private organizations. So much so that in some cases more than 50% of the cost is met through different kinds of subsidies. Now the question arises that if we want a meaningful transition to non-fossil based energy use how far can we go and how long can the government continue to subsidize this transition? We definitely need to concentrate on the cost management of renewable energy solutions to make them economically viable and competitive. That is what GSS is working hard to achieve and would like to make a solid contribution to this end. GSS RE-Integration System Technology® (GSS REST or simply REST) is a comprehensive system of renewable energy management. The system technology integrates four major sources of renewable energy, viz. geothermal, solar, wind, and carbon based renewable fuels preferably derived from wastes, in a cost effective way to achieve a high energy efficiency of renewable resources. Integration strategies of this system technology minimize energy losses, enhancing the overall efficiency of the system. Similarly, it solves the availability and storage problems of renewable energy, especially solar and wind, while reducing dependence on storage batteries. GSS RE-Integration® system technology is scalable and can therefore be tailored for the needs of any level of energy consumer—domestic, commercial, industrial including construction and agricultural industry, and even utility level power generation. It can make a significant contribution to a meaningful transition to non-fossil based energy use.

GSS is a technology development company and would prefer to license technology to established manufacturing companies at very low royalties (e.g., 1-2%). We can also try to merge or collaborate with an established or new promising startup organization with similar areas of business activity. Alternatively, GSS may collaborate with manufacturers to produce components of the system in partnership. GSS will stand behind its system technology and would take full responsibility for trouble-free, safe, and dependable functioning, with a full money back warranty. The distribution system would be elaborate, involving extensive training, but still cost effective by eliminating middlemen. Similarly all the components of the system will be produced in the United States. At this point GSS does not have a definite estimate of the cost of the GSS integrated system. However we, at GSS, are optimistic that we can bring down the cost of renewable energy use to almost half of the conventional fossil based energy. Grossly speaking, the cost of the smallest domestic system would be \$30,000 to \$40,000. Big residential complexes like a hundred room hotel may cost five to seven hundred thousand dollars and payback time would be less than six years. Similarly very big systems may pay off in three to four years.

Our business model would have two parts and preferably would have two separate managements for better control under an overall management system.

1. **Hardware Management:** Manufacturing of System Technology Components and subcomponents, along with procurement of all kind of accessories like piping/wiring and instruments/gauges such as sensors, actuators, controllers, etc. Again all manufacturing can be completely outsourced or produced in some kind of collaboration with established manufacturing companies.
2. **TECHNOLOGY COMMISSIONING MANAGEMENT:** Technology Commissioning management team would be basically composed of R&D team members including several HVAC experts. They would be directly involved in the commissioning of big projects, especially the first half dozen projects. The commissioning management team would also be responsible to recruit and train independent commissioning contractors from practicing HVAC professionals. Training would include basic knowledge of the system technology necessary for the smooth functioning, maintenance and trouble-shooting of the commissioned systems. Since we would be selling technology with about ten year repair/maintenance contract and full money-back warranty, the selection and training procedure would be important.

## MARKETING STRATEGY

Prospective customers' lists in different categories will be prepared like bank buildings, hotels, schools/colleges, office buildings, shopping malls, etc. Similarly factories lists like small size factories, medium size factories, and large size factories lists, will be prepared. Prospective customers in each kind of lists will be offered technology packages via e-mail and regular mail to start the technology sales process. Meetings will be scheduled with the interested parties to finalize the details. Please see the technology package example for hotels, based on a hundred rooms' hotel.

Our system technology would not be like buying a hybrid car, where you pay upfront more than what you expect to save in the life of the car. If you finance the hybrid car through a bank, you would definitely end up paying a lot more than you would for a regular car. GSS intends to help finance the integrated energy systems for customers through commercial banks with reasonable interest rates, sharing responsibility along with the contractors, although the main responsibility would lie with the customer. Presently, GSS needs \$1.9 million, for capital goods to complete R&D work (prototyping and trials). Patent applications will be filed for all major components of the system, after prototyping and trials, while one component of the integrated system already has a patent pending status. Regarding competitive advantage, GSS would certainly have a technological edge in the market. Our competitive edge can be summarized as better, safer, more dependable, and cost effective renewable energy solutions in the market. Once R&D work is complete and we are able to demonstrate the strength of GSS technology, in terms of cost, performance and efficiency, buyers will consider our systems with greater interest.

## **GSS RE-INTEGRATION SYSTEM TECHNOLOGY PACKAGE OFFER FOR A HUNDRED ROOMS HOTEL**

Here is an example of a RE-Integration System Technology package offer for hotels, which includes all costs with a ten year repair and maintenance warranty. (Additional warranties on a yearly basis or 5 and 10 year basis would also be available at reasonable rates.) Average daily cost of energy per room of a hotel is a little over six dollars. According to Energystar.gov, "On average, America's 47,000 hotels spend \$2,196 per available room each year on energy," with the average annual energy cost of a 100 room hotel being \$219,600. Similarly, ten years average energy cost of a 100 rooms' hotels at present energy rates would be \$2.196 million. Now GSS offers you a guaranteed energy cost savings of \$384,300.00 in ten years. That is \$38,430 in energy cost savings per annum. After the first ten years the annual cost savings would climb close to a hundred thousand dollars, based on the present energy rates. Please note that these substantial cost savings don't include any federal or state subsidies, tax rebates or tax credits. The following are detailed calculations of a proposed offer for a hundred room hotel.

**Down payment** (equal to one year energy cost) at the signing of the contract - \$219,600

### **Year wise payments and savings**

<b>Years</b>	<b>Payments</b>	<b>Savings</b>
First year payment @ 95% of the annual cost	208,620	10,980
Second year payment @ 90% of the annual cost	197,640	21,960
Third year payment @ 85% of the annual cost	186,660	32,940
Fourth year payment @ 80% of the annual cost	175,680	43,920
Fifth year payment @ 75% of the annual cost	164,700	54,900
Sixth year payment @ 70% of the annual cost	153,720	65,880
Seventh year payment @ 65% of the annual cost	142,740	76,860
Eighth year payment @ 60% of the annual cost	131,760	87,840
Ninth year payment @ 55% of the annual cost	120,780	98,820
Tenth year payment @ 50% Of the annual cost	109,800	109,800
<b>Total Costs and Total Savings</b>	<b>1,592,100</b>	<b>603,900</b>

**NET SAVING = 603,900 – 219,600 = 384,300**

Note: This offer is contingent on the assumption that the masonry work involved in the retrofitting of the RE-Integration System Technology is as low as possible. Otherwise the cost may increase by up to 5%. Similarly solar and wind resources availability factors may or may not slightly affect the system cost but the energy cost savings may drop by up to 10%.

We have also submitted an unsolicited grant proposal to the Department Of Energy. Please see the first part of the proposal on the following pages.

**Abstract:**

GSS Renewable Energy Integration System Technology® (GSS RE-INTEGRATION or GSS REST) is a comprehensive and flexible system of renewable energy management that can be adjusted to suit any kind of climate conditions. This holistic approach integrates four major sources of renewable energy, viz. geothermal, solar, wind, and carbon based renewable fuels preferably derived from wastes, in a cost effective way to achieve higher energy efficiency of renewable resources. Integration strategies of the system technology minimize energy losses, enhancing the overall efficiency of the system. Similarly it solves the availability and storage problems of renewable energy, especially solar and wind, while reducing dependence on storage batteries. GSS REST is scalable and therefore can be tailored for the needs of any level of energy consumer—domestic, commercial, industrial including construction and agricultural industry, utility level power generation and even can be extended to surface transport engines, like buses, trains, sea ships, etc. It can make a significant contribution to a meaningful transition to non-fossil based energy use and hence help reduce global warming threat while reducing energy cost.

Strength and efficiency of RE-Integration System Technology is based on the specially designed system components. The basic approach followed in designing the innovative system components is to conserve every single unit of energy that can possibly be saved or recovered. The capacity of a system can be increased by increasing the sizes and number of components. Similarly the system technology is adjustable to meet any unique energy demand, in any climate conditions, by selecting suitable sizes, number, and kind of components. GSS RE-Integration System Technology offers safe and improved techniques for energy storage, management and use.

Note: Please see the pending Patent; High Torque Vertical Axis Windmill;

<https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US20120070282.pdf>

## RATIONALE BEHIND RE-INTEGRATION SYSTEM TECHNOLOGY & SCOPE

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**Wind and Solar Energy Capture and Storage:** Before the invention of steam engines, windmills were the main prime movers available to grind grains and to pump water. Today we can build better and more efficient windmills to harness wind energy. High Torque Vertical Axis Windmills (patent pending) can be used for this purpose. Wind and solar energy availability because of its intermittent nature necessitates some kind of energy storage arrangement. RE-Integration technology will use underground reinforced concrete tanks to store wind and solar energy as compressed air. These storage tanks are safe, cost effective and can last more than a hundred years.

**PRESSURE BOOSTING HEAT PUMP:** These high efficiency heat pumps can boost the pressure of the compressed air and can also work in succession as primary booster, secondary booster, etc. Basic air compressor (rotary vane/screw or scroll), driven by the windmill, will supply compressed air at low to medium pressures such as 20 psig to 100 psig. Pressure boosting heat pumps working singly or sequentially can raise the pressure up to 10,000 psig. Heat generated in the compression process can be efficiently used for space and water heating. Places where wind resources are not abundant but solar resources are plentiful, pressure boosting heat pumps can use steam as a working fluid to compress air at a very high pressure. Steam will be generated by solar heaters and super heaters.

**SPECIFIC HEAT CAPACITY OF AIR:** Specific heat of air is low, even at elevated temperatures and pressures, almost one fourth that of water. This means a small quantity of heat energy will be needed to double or triple the pressure of a volume of air and hence the potential energy in the compressed air. Preferably solar heaters and super solar heaters will be used to heat compressed air. But where solar resources are not abundant, any carbon based renewable fuel or natural gas can be used. A compressed air supply tank, another key component of the system fitted with all the above said heating options, will boost and maintain minimum required pressure needed by an efficient compressed air turbine. Similarly, highly efficient innovative steam and compressed air turbine designs will be used. Separate patent applications for each component will be filed after prototyping, trials and any needed refinement.

**Dual Purpose Compound Heat Exchangers,** with innovative features, will enhance energy efficiency by minimizing energy losses. Similarly innovative designs of air and steam turbines and motors will considerably boost their efficiency. GSS RE-INTEGRATION System Technology, when partly using carbon fuels, will definitely exceed the efficiencies of Co-generation, CCGT, IGCC, etc., and set the pace. This flexible technology can incorporate new future developments, like V3 cell technology, etc.