PROJECT AT A GLANCE

i.	Project	:	To set up a 280 MW Gas Based Combined – Cycle Power Plant.
ii.	Capacity at 100%	:	280 MW
iii.	Period of Operation	:	330 days
iv.	Project Promoters	:	M/s. Shriya Engineering Ltd., Lucknow, U.P.
v.	Plant Location	:	A plot of land measuring 50 acres (already in possession 10 acres) at Village – Chakdadar, Tensil – Paragena Rai Bareilly.
vi.	Basic Engineering Consultants	:	Fizika Scientific New Zealand.
vii.	Review Engineering Consultants	:	NTPC
viii.	Detailed Engineering Consultants	:	MARIENTAL INDIA PVT LTD. & ASSOCIATES NEW DELHI, INDIA.
ix.	Gas Requirement . (At 100% capacity)	:	21.996 mill. MMBTU

x.	**Capital Cost of the projects**			**(Rs. Crores)**
	Total Project Cost		**=**	**1047.00**
	1.	Land & Site development	=	11.79
	2.	Building Costs	=	23.90
	3.	Plant & Machinery inc. spares	=	638.02
		(a) Imported	=	464.82
		(b) Indigenous	=	153.08
		(c) Spares & installation	=	20.13
	4.	Process Know-how fee & Detailed Engg. & consultancy services (Including basic and review Engg.)	=	23.00
	5.	Expenses on erection supervision training & startup	=	44.72
	6.	Margin Money for working capital	=	3.13
xi.	**Source of finance**			
	1.	Secured / Long – term loans	=	693.00
	2.	Share equity from promotors (Shriya) & co-promoters (Bushtrack Pvt. Ltd., Fizika Scientific)	=	178.00
	3.	Public Shares	=	171.00
		TOTAL	**=**	**1047.00**

xii.	**Year-wise Capacity Utilisation%**	:	
	1st Year	=	60%
	2nd Year	=	70%
	3rd Year	=	80%
xiii.	**Cost of Gas (at 100% capacity)**	=	586.17
xiv	Utilities	=	4.80
xv.	Manpower (Total = 102) (Direct-89, Contract -13)	=	350.00
xvi.	Cost of Power	1st year	= Rs. 376.29
		2nd year	= Rs. 436.47
		3rd year	= Rs. 496.70
xvii.	Revenue Realisation (Power Transmitted)	1st year	= Rs. 547.43
		2nd year	= Rs. 638.67
		3rd year	= Rs. 729.91
xviii	Gross Profit (before interest & depreciation)	1st year	= Rs. 171.14
		2nd year	= Rs. 202.20
		3rd year	= Rs. 233.20
xix	Operating Profit (after interest & depreciation)	1st year	= Rs. 62.94
		2nd year	= Rs. 93.35
		3rd year	= Rs. 123.14

xx	Return on Investment, %	1st year	=	Rs. 17.55
		2nd year	=	Rs. 26.44
		3rd year	=	Rs. 36.23
xxi	Break Even Point, %			
	i. At Installed Capacity (100%)		=	Rs. 47.50
	ii. At Optimum Capacity (80%)		=	Rs. 59.37
xxii	Debt Service Coverage Ratio (DSCR) Average		=	1.68

INTRODUCTION TO THE PROJECT & THE PROMOTERS

THE PROJECT

SHRIYA ENERGY LIMITED (SEL) envisages to set up a 280 MW Gas based Power Plant in the State of U.P. at Village – Chakdadar situated at a distance of about 5 km from Ratapur crossing of Rae Bareilly town along the road leads to Amana & Faizabad. SEL have already purchased about 10 acres of land and are in the process of purchasing further land along the adjacent plot to accommodate other auxiliaries and also the essential staff curators and administrative block etc.

SEL has been seriously but systematically progressing in the pre-implementation activities of the project, as some of the major activities have already been taken care of the completed. These include the formalization and signing of the agreement with Gas Authority of India Limited (GAIL) for un-interrupted supply of LNG from their supply point, which is about 3.4 Kms from the site of the proposed power plant.

SEL have also entered into a power purchase agreement with the Power Grid Corporation of India and in this case also the most significant feature being the nearness of the 220/132 KV Power receiving sub-station situated right across the road with a maximum distance of about one KM only.

The company has entered into Technical and Financial Collaboration agreement with Fizika Scientific (FS) of New Zealand for supply of technical know-how and the Power Plant Machinery. FS would also be providing the supervision for erection, commissioning and operation of the plant until the technical staff of SEL get fully trained to operate independently. The techincal collaborators who are one of the world pioneers in the field of Gas based power plants, have consented to lend a long term association to SEL and shall also be contributing towards the share capital of the company if desired.

U.P. as such being one of the major power deficit states in India, encourages the investment in power sector in big way, while offering a host of economic incentives to the entrepreneurs from private sector to lure their investments in the ventures in this important infrastructure.

Presently only 20% of the rural house holds in the state of U.P. are fortunate to enjoy the supply of power though in poor quality. There are 2.7 mill. diesel pump sets against 0.7 mill. pumps only, based on electricity, which speaks of a very disappointing situation of the state on it's power front.

In order to achieve the per capita consumption of power in the State only eqvt. to that of the average consumption in India, the State would require about 4000 MW of new capacity. It implies that the 280 MW Gas based Power Plant, proposed to be set up by SEL is going to fulfill just 7% of this demand after it gets operational.

Technical Collaborators

SEL have tied up with M/s. Firika Scientific of New Zealand for providing the Engineering Consultancy Services related to power plant, which may also include their specialized know-how. Fizika Scientific are world wide pioneers with specific experience in gas based power plant.

SEL for Gas Procurement

SEL has already entered into a contract with the Gas Authority of India Limited (GAIL) for supply of LNG for the proposed power plant, which was effected on 11.10.2006 and signed by Mr. Saurabh Tewari, Director on behalf of SEL and Mr. K. Vijaya Kumar, Sr. Manager – Gas Marketing of GAIL from their Lucknow Zone office. As per this agreement, GAIL stands committed to supply the desired quantity of gas required by the proposed power plant.

Proposed Management Sturcture of SEL

As already explained, the Board of Directors of SEL would comprise of highly qualified and experienced members of proven merit in the field of power industry, finance and management. The Chairman of the company supported by the members of the board would be responsible for policy planniong for the execution of which the responsibility ???? vested in the Managing Director of the Company. SEL will have a whole time Executive Director, who will be reporting to the Managing Director and remain responsible for the day to day operations of the power plant. He will be associated by General Managers of individual departments. The company is expected to follow an open policy and encourage the talent of the managerial and supervisory personnel.

CONFIGURATION OF THE PROPOSED POWER PLANT

INTRODUCTION

SEL has been in the process of discussions with variious companies world wide over the technical configurations, which would be the most appropriate for the proposed power plant. The objective of these discussions has been to decide on the configuration, suitable for Indian conditions for it's operational economics as well as for the simplicity of design. The plant configuration finally decided upon is described as under.

PROCESS PLANT CONFIGURATION

Out of various options offered by various vendors, which were thoughfully perused for the consideration towards the optimum capital cost of the project, the availability of land and the locational logistic, it was decided to set-up two parallel trains in a phase manner. To start with the power plant in it's first phase of implementation would be further augmented, integrated and optimized in the second phase of the project with the installation of the second train.

It is further considered that the construction of the civil foundations and other support structures for the installation of the second modular train would also be got constructed and kept ready during he implementation of the first phase of the project itself. This way the plant in operation would experience least disturbance during the installation of the plant and machinery for second phase whenever executed.

The configuration of the power plant on the basis of the techno economic considerations weighed in favour of having a multi-shaft arrangement with Class-E Gas Turbine Supplemented by one HRSG-2/3 level steam generation system for the operation of a steam turbine with condenser. The stock for dispersion of gas emission shall be installed with a height of about 70 to 80 mtrs.

The power plant shall heve a synchronous air and water cooled generator running 3000 rpm and delivering power at 11 KV.

The two / three level steam turbine shall be accompained with suitable control system on the inlet pressure of steam to take care of the variation in load and frequency of the power generator. It would also be connected to a synchronous air cooled power generator operating at 3000 rpm.

The gas turbine will be equipped with a suitable gas burner system with low emission of the oxides of nitrogen and carbon monoxide so as to conform to permissible norms. The air for combustion shall be supplied by a suitable intake fan and turbine exhaust gas. The plant shall be operated from centralized control room through suitable DCS / PCS system under a professional supervision on data acquistion, energy management and monitoring system so as to ensure high efficiency and reliable operation of the power plant.

The stepping-up of the voltage of the power generated from gas and steam turbines to the desired 220 KV level shall be handled by triple wound oil immersed transformers. It is planned to have a top quality high voltage switch yard with suitable import export points and a switch gear.

The common facilities such as the important utilities and auxiliary services for plant operation would include the following:

i) Adequate quality of raw mater, it's treatment & distribution system.
ii) Cooling water for removing the excessive heat from the gases.
iii) De-mineralized (DM) water for steam generation.
iv) Effluent treatment plant.
v) Centralized control room and sub-station.
vi) Storage tanks for liquid fuel.
vii) LNG receiving and metering station etc.

The section wise lists of equipments for the power plant are listed in Table 5.01.

TABLE – 5.01

Section wise list of Equipments and other Components of Plant and Machinery of the Power Plant.

S.No.	Section / Block	Equipment / Components
A.	Gas Turbine Block	i. Gas Turbine with Fuel gas & Auxiliaries ii. Generator & Exciter iii. Starting Package iv. Air intake / exhaust system v. Fuel system vi. Associated Mech./Elec. Packages vii. Fire Protection System.
B.	Steam Turbine Block	i. HRSG Boiler & Accessories ii. Steam Turbine iii. ST generation / Exciter iv. Condenser Including air removal system v. Boiler feed pumps vi. Condensate pumps vii. Critical Values viii. Control systems
C.	Other Equipments & Systems	i. Plant Control & Monitoring system ii. Fire protection system iii. Lightening protection iv. Gas reduction / computer system v. Noise protection system / Vibration protection vi. Main machine transformers vii. High voltage swithgear viii. Closed loop cooling system / Air cooled system.

D.	Utilities & Other system	i. Raw water systems ii. Cooling water systems iii. Water treatment plant iv. Waste water treatment & disposal system v. HVAC system vi. Fuel gas receiving and metering system vii. Condensate Recovery & Recirculation system viii. Compressed Air system ix. Switch yard x. Sub-station / control room
E.	Non-Process Anxiliaries	i. Data Processing & documentation system ii. Communication system iii. Fire fighting system iv. Environment Impact Monitoring and Recording System v. Input / Output inventory.

SUPPLY OF GAS TO SEL POWER PLANT LOGISTIC & ESTIMATED ANNUAL QUANTITY REQUIREMENT & COST

SOURCING OF UNINTERRUPTED GAS SUPPLY TO THE POWER PLANT

SEL for last two years has been exploring various possibilities for procurement of gaseous fuel i.e. LNG with assurance for it's uninterrupted supply. The company has been in dialogue with GAIL (India) Limited ever since, when the later issued the proforma on "Heads of Agreement" (HOA) on September 12, 2005, which is a sort of application for procurement of 12,14,400 Standard Cu.M. per day (SCMD) of LNG to meet the requirement of one 200 MW Power plant. GAIL (India) Ltd., had made it clear that in view of the fluctuating upward price of LNG as per the trend for last many months, the import price that time was taken as US$ 4.0 per MMBTU on FOB basis. On this basis the cost of import, the delivered price of LNG was tentatively fixed at US$ 5.2 to 5.5 per MMBTU, which however was exclusive of transmission charges and taxes as applicable. The annual contract quantity was to be finalized on the basis of the gas having a Gross Calorific Value (GCV) at 9880 K. Cap per SCM for the particular year. The price was also fixed on the basis of the parity of the US$ against Indian Rupees.

The contract however specifies that GAIL (India) Ltd., agrees to deliver any of the additional volume of gas over and above the ACQ in a contract year subject to the availability of re-gasified LNG and capacity in the seller system to transmit such gas.

UTILITIES REQUIRED
AND
IMPACT ON ENVIRONMENT

UTILITIES

The major utilities required for the proposed gas based power plant are

i) Water
ii) Compressed Air
iii) Liquid Fuel for D.G. Set used for black start.
iv) Power.

WATER

Raw Water

Water as a utility is required in various forms for various applications in the power plant such as –

a) Water for services, fire hydrants and for various other applications after treatment.
b) Treated water for potable use
c) De-mineralized water for condensate cooling & boiler feed.

A thermal power plant irrespective of the fuel used has a very large requirement of water, mainly for generation of High Pressure Steam and majority of it gets consumed in cooling of the flue gases, while the condensate is recycled to the Boiler known as Heat Recovery Steam Generator or “HRSG”. A large quantity of water is required to be sourced to meet the desired process requirements.

SEL envisages to tap initially the sub soil water resource, where from it would be pumped out and stored in a large storage tank constructed in R.C.C. at the ground level, proposed initially for a capacity of about 9000 Cu.m. A provision shall also be made to construct an overhead water tank with a capacity of about 200,000 ltrs. for the general consumption and also to meet the requirement for fire fighting as per the statutory norms.

The raw water shall be drawn from the bore wells by high capacity submersible pumps and discharged into two large tank reservoirs at the ground level, each to hold about 45000 cu.m. of water. Since water from the site has already been tested and found to be sweet water with tolerable hardness, it shall be filtered using high capacity sand filters and pumped into an overhead water tank with a capacity of 200 cu.m., which holds water for general use while 50% of the capacity i.e. 100 cu.m. is always kept in reserve for fire fighting. For meeting high requirement of raw water, it may be necessary to get about 4 to 5 number of tube bore wells each of about 200l cfm capacity to deliver the desired quantity of water for large storage capacity.

D.M. Water

For the huge consumption in condensers, the quality of the water has to be such that it is free from any charged ions. For this purpose, the raw water is subject to Reverse Osmosis (RO) using special membranes which reduce the dissolved monovalent or bivalent mineral content to the desired limits, and then it is further treated in a DM water plant for removing the left over ionic contents. The DM water is stored and pumped to the point of use.

Drinking Water

For the purpose of drinking, raw water from the O.H. water tank is supplied to the individual areas, where it is treated at the point of use through wall mounted treatment units comprising of RO system (if necessary), activated carbon filters and ozoniser or UV light, so as to ensure that it gets free from any pathological activity and safe for drinking.

Water for Services

The water for services and conveniences is directly drawn from the over-head water tank to the point of use in all the areas.

Boiler Feed Water

As regards the feed water for "HRSGs", it is derived from the condensate, which is DM water only at a higher temperature augmented by the make-up water in adequate quantity, which is met from the DM water reservoir. The loss of water due to evaporation is quite large and hence the huge requirement of make-up water is envisaged.

The storage and water pumping system

For a requirement of over 3 to 4 days of water, it is proposed to have a storage capacity of about 90,000 cu.m. stored in 2 raw water reservoirs constructed at ground level, each with a dimension of 225 mtr. x 100 mtr. with depth of water remaining at 2 mtr. The number and types of pumps proposed to be installed would be the following

i. Submersible Pumps

No. of Pumps	4
Capacity & Head	200 cu.m. / hr., 100 Mtr.

ii.		Sludge Treatment Pump
	No. of Pumps	2 Nos.
	Speed	1450 rpm
	Type	Vertical Centrifugal
	Capacity & Head	30 cu.m. hr x 15 MWC
iii.		Cooling water (CW System)
	No. of Pumps	3 Nos.
	Flow	1450 cu. m./hr
	Speed	496 rpm
	Head	20.5 m
iv.		High Pressure (HP) Feed Water System
	No. of Pumps	3 Nos.
	Volt / Current	6.6 KV/194.5A
	Speed	325 rpm
	Temperature	155.7 deg. C

Waste Water

The waste water from a gas based power plant does not carry any contamination of concern, as it is primarily generated out of floor washing whenever done and hence the treatment procedure of the waste water is usually simpler. After the suitable treatment, the water is re-cycled and partially used for irrigation purpose to promote landscaping of the area into an eco-friendly environment.

v) Non-process areas like

a) Time and security offices

b) Weigh Bridge

c) Indoor and outdoor lighting &

d) General control room

Electrical receiving and distribution system including the HT generation and transmission system which would include an HT switch yard along with a sub-station. The power generated from the D.G. set is meant for black start and other emergencies.

IMPACT OF PROPOSED POWER PLANT ON ENVIRONMENT

Even though the Gas Based Power Plants, do not as such affect the environment so much as the gaseous and liquid pollution levels keep almost minimal, nevertheless the environment impart (EIA) assessment is already in progress at the site for the proposed power plant, which is likely to be over by middle of August / September, 2007. The main terms of reference of this study are the following:

EIA on Air Quality

The ambient air quality is monitored for determination of parameters like SPM (suspended particulate matter), RPM (respirable particulate matter), NOx (nitrous oxides), SO2 (Sulphur dioxide), HC (hydrocarbons), CO (carbon monomide), HCI (hydrogen chloride), NH3 (ammonia), H2S (Hydrogen sulphite), O3 (ozone), C1-F1 (halogens), Pb (lead), etc. Stack emissions are monitored for temperature, velocity, monitored for exhaust gases, SPM, RPM, Pb, CO, HC etc. & smoke density Aerobiological monitoring is also done sampling & analysis is done in accordance with relevant Indian Standard Sepcifications IS 5182 (Part I to XVIII), IS 8118-1976, IS 8635-1977, IS 9005-1978, IUS 9057-1979, IS 078-1979 & APHA: 1977.

EIA on Water Quality

Water quality, including effoluent testing, involves site measurement for / Temperature, Colour, Odour, pH, Conductivity, D.O. (Dissolved Oxygen) &

Residual Chlorine & Sample Collection. Samples are analysed for physical physico-chemical & microbilogical characteristics as specified by India Standard

Specifications: IS 2296: 1982 (Classes Aa to E), IS: 2490, GSR-422 (E), IS 10500-1991 & IS 13428-1998. Over 40 characteristics can be analysed.

EIA on Noise Pollution

Noise levels are monitored by source measurement in decibels (dB) Ambient noise levels are monitored in leq (level equivalence). Monitoring is done by imported sound level meters, one of who is equipped with octave analyzer for variable noise frequency. Monitoring is done in accordance with IS: 9901 (Part – V) – 1981, IS: 11702 (Part-II) – 1986, IS: 4758-1958-1968, I, IS: 3932-1966, ISL 2264-1963, IS: 3028-1980, IS: 9001 (Part 21) – 1985, etc., as required.

EIA on Soil

Soil Testing Division monitors soil quality. All physical, physico-chemical & microbiological characteristics exceeding 41 in number are determined in accordance with ICAR and UISDA standards. These include permeability, infiltration rate, wilting coefficient, cation/ anion, exchange capacity, sodium absorption ratio, total hetrotrophs, actinomycetos, fungi etc., Micronutrients copper, lead, zinc, iron, molybdenum and fluoride, as well as, boron & lithium are regularly analysed. Fertilizers, vermicompost, municipal solid waste, oils lubricants, etc. are also analyzed.

Pesticide Residue Testing : Laboratory possesses full-fledged facilities of computerized GLC, standards, consumables, procedures, and trained & skilled scientists / analysts for testing of pesticide residues Laboratory has tested pesticide resides for Diversified Agriculture Support Project (DASP) in agro-products like cereals, vegetables, fruits, milk / milk-products, fodder / grass etc.

The laboratory has been regularly participating in Analytical Quality Control (AQC) exercises conducted annually by Central Pollution Control Board (CPCB). The result rank us amongst the top twenty (on a scale of 100) environmental laboratories in the country.

PROPOSED POWER PLANT LOCATION
VIS-A-VIS
THE TECHNO-ECONOMIC ASPECTS

INTRODUCTION

The location for the proposed 280 MW gas based Power Plant being set-up by SEL has been identified and finalized in Village – Chakdadar, situated at a distance of about 5 Km. from the Ratapur crossing in Rae Bareilly town, as the road turns at right angles to the left when approached from Lucknow. It falls on the road that leads to Faizabad. This location in Distt. Rae Bareilly keeps always in the lime light because of being a VIP constituency for the Parliamentary elections.

The distinct features of the district of Rae Bareilly are described as under:

Geography

District Rae Bareilly forms a part of the Lucknow Division. On the north it is bounded by tehsil Mohanlalganj of District Lucknow and tehsil Haider Garh of district Barabanki, on the east by tehsil Mussafir Khana of district Sultanpur and on the south east by Pargana Ateha and the Kunda tehsil of district Pratap Garh. The southern boundary is formed by the Ganga which separates it from the district of Fatehpur. On the west lies the Purwa tehsil of district Unnao.

Area & Topography

The district, covering an area of 4609 Sq. kms, is fairly compact tract of gently undulating land. The elevation varies from about 120.4 m. above sea level in the North West to 86.9 m. above sea level in the extreme South East.

The river Ganga, which is the only river of any magnitude in the district touches it near the villages of Gadumau in the extreme West of Pargana, forming the Southern boundary of the district, runs South East as far as Village Barua.

Climate

The district lies in the vast Gangaetic plains of North India sloping gently to South East. Relief from the summer heat arrives with the monsoon in second half of June, though the weather may often remain sultry. The winter sets in November and lasts up to February generally.

The district receives approx. rain fall of 1913 mm per year. The peak temperature touches about 43 $\pm$ 2º C in summer and remains at a minimum of about 16 $\pm$ 2º C in winter.

SOCIO ECONOMIC ASPECTS

The site of SEL power plant falls in the Village – Chakdadar, Tehsil – Pargana of District- Rae-Bareilly, lies at a distance of only about 7 km. from the town. It is a small village inhabited by only 79 farmer families cultivating various kinds of crops and engage 30 agriculture labours. This village has an area of 122 Sq. Kms. with a total population of about 450, about 40% of which, belongs to poorer category. The employees of the power plant would have to bank upon the Rae Bareilly town only for the infrastructure and socio economic facilities which include educational institutions, hospitals and shopping areas etc., since it lies just about 6 to 7 kms. only from the site.

SOCIO ECONOMIC FEATURES OF RAE BAREILLY

The district has a total area of 4609 Sq. Kms. and is inhabited by about 29 lac people, of which about 90% belong to rural areas. The entire district has 44% literacy level and all efforts to increase the same to at least about 65% in next few years are in force.

The district comprises of 7 Tehsils, 21 development complexes and 1733 habitated villages. The entire district has as many as 159 bus stations and 25 railway stations, which makes the commuting very convenient. The site is well connected by good roads with other districts of U.P. like Lucknow, Bara Banki, Unnao, Sultanpur, Fatehpur & Pratapgarh etc.

It is interesting to note that in this district, there are as many as 420 post offices in rural areas, against only 26 in urban areas has about 47,500 telephone connections.

There are 62 Nationalized Banks, 78 Rural Bank branches and 32 Cooperative Bank branches in operation in the district.

There are 995 fair price shops all over the district in rural areas and 116 in urban areas. The district has as many as 8500 bio-gas plants, which supply little pollution gaseous fuel to the villages.

The major agriculture crops include food grains to the extent of 721.000 MT, Sugar Cane 236.000 and potatoes 123.00 MT.

Most of the towns / cities and villages are already electified, but there remains acute shortage of power due to which there are long hours of load shedding experienced by the people.

There are 11 cinema halls in the district with a total sitting capacity of 6718.

Education:

The district has about 2400 Junior Basic / Primary Schools, 580 Senior Basic Schools, about 200 Inter / High Schools, 9 degree college, 4 ITI's and one Polytechnic. This is an indicator that adequate personnel for supervisory positions and skilled, semi-skilled labours are going to be recrutied locally, for the proposed project.

Health Services:

The medical facilities in the district are well organized and fairly accessible. The district has 34 Allopathic, 57 Ayurvedic and 52 Homoeopathic Hospitals. There are 72 Primary health centre and 380 family welfare sub-centre. There are 3 specialty hospitals in the district or treatment of Tuberculosis, Leprosy, Communicable Diseases etc.

Connectivity by Road

The district has about 3450 km. of metalled roads, most of which have been constructed by the State Public Works Department.