Integrated Energy Development, Inc.

A Totally Integrated Developer of Agri-Biomass Energy
And Combined Cycle Power Generation Plants

Business Plan
(Prospectus)

1984

DRAFT

INTEGRATED ENERGY DEVELOPMENT, INC.
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INTRODUCTION

Integrated Energy Development, Inc. (IED) will be a California corporation, headquartered in Sacramento, CA. The corporation is comprised of Dur Thetford, President; Bill Kidd, Vice President/Finance; Thor Bailey, Vice President/Biomass Fuel Development (25% of shares of **IED** will be owned by Energy Production, Inc. Thor Bailey will be Chairman and President of Energy Production.) Jim Jungwirth, Vice President/Plant Siting and Permitting; Kirby Hammond, Executive Vice President/Project Development, and a yet to be named venture capital stockholder. Resumes on each principal have been included in the business Plan. (Exhibit A)

IED, Inc. is being formed to develop a total integrated company with coordinated management in collecting, supplying and managing biomass fuel (agricultural and forest residue, and urban woodwaste); evaluating, planning, siting and constructing combined cycle power generating plants.

Three principals; Kirby Hammond, Jim Jungwirth and Thor Bailey were instrumental in siting a $30,000,000 (18 Megawatt) power plant in Oroville, CA. The plant is now in the final construction phase with start-up of early fall. This combined experience, plus the business management and financial expertise of Dur Thetford and Bill Kidd gives **IED** the edge in avoiding start-up pitfalls experienced by many biomass energy companies.

This concept of one company controlling fuel, siting, development and operation of small efficient electrical power plants will provide opportunities for the profitable and efficient production of process heat, steam and electricity.

POWER PLANT SELECTION

The Principals of IED have several years' worth of background in biomass conversion power plants. The history of burning wood for energy isn't new; however, wood wasn't considered for commercial power projects until the late 1970's. Before that time wood was used primarily to rid a company of an overwhelming transportation and disposal problem arising from the waste wood being produced by its processes. The positive side benefit was the creation of useful energy such as spare heat, steam or even electricity.

As fossil fuels were increasing in price, more importance was given to plant size, efficiency, cost of fuel, etc. Very few early power plants gave consideration to the quality of their wood fuels. Since fuel was either free or very cheap, the only decision was how much to deliver. Today, woodwaste is viewed as a saleable fuel source and importance is given to such things as moisture content, fuel quality, percentage of unburnables, fuel pile control, transportation, etc. Wood fuel has gone from a negative value to over $25 a ton in most of California. This fuel will only level out when the supply and demand are in balance.

Early plants which did not consider plant efficiency will become dinosaurs as new technology develops. The approach taken by IED is to look for that technology which provides the best all around protection to the profitability of such a venture. Some considerations which are important are plant efficiency, emission levels, total capital costs, noise, aesthetics, construction time, ease of automation, plant availability, O&M costs, tax benefits and guaranteed source of fuel.

The most efficient power plants today are the combined cycle types. The reason for the high efficiency is because when the gas turbine is fired to provide shaft power for an electrical generator, the exhaust heat is used to generate steam in a waste heat boiler. This steam is then used to

turn a steam turbine for additional power. Normal wood burning power plants generate only steam and therefore are unable to utilize the combined cycle technology.

Wood gasification has been around for a hundred years and has successfully driven diesel type engines for over 40 years. The commercial/industrial application for wood as a fuel in power plants was not feasible until the late 1970's because of the relative cheap cost of other fossil fuels. Gasification technology has been geared up because of being able to retrofit existing gas and oil boilers, decrease emission levels, and utilize a large range of fuels. Gasification projects today are beyond the stages of Research and Development and offer an alternative means of combustion.

Once we gasify our wood fuel, we then pass this biogas with its latent heat to a combustor where it is burned and passed through a heat exchanger. A gas turbine has been modified to run as a hot air turbine. As the heated air is passed through this hot air turbine, it then has the energy to turn a generator to produce electrical energy. This is the first step to the combined cycle system. The second step is to take the heated flue gases from the gasifier and the exhaust gases and run them through a waste heat boiler to generate steam. Once we have steam, we then can generate additional electricity by using a steam turbine. (Exhibit B)

There are many of these types of plants operating today in California using natural gas. The main difference with an IED project is that the gas turbine will be slightly modified to accept the hot air from the heat exchanger. The gasifier would support the plant under normal operation and natural gas would be available for start-up, and for scheduled and non-scheduled down time.

Mitsui Engineering and Shipbuilding Co., LTD and their representative, Douglas Energy Co. have assured us that they will provide full performance guarantees on the

technology required from their "hot air turbine combined cycle." The efficiency of converting biomass to energy by this method brings us to a new level of cogeneration. In addition, Mitsui Engineering & Shipbuilding will assist with construction financing through their parent company, with take-out financing arranged.

WOOD ENERGY - SHORT AND LONG TERM

The collecting of biomass for direct combustion generating plants is relatively new and only since 1979, when the California Legislature passed the "State Agricultural and Forestry Residue Utilization Act of 1979" (SAFRUA), has any demand for wood fuels been required.

To date, the majority of shutdown or abandoned biomass generated power plant sites has been the lack of a firm fuel supply. Financial institutions need assurance that the power plants will be in operation through the life of the financing terms, usually 7 - 10 years.

The principals of **IED, Inc.** have the background and knowledge to acquire sufficient fuels on the short and long term.

First, the short term fuel needs must be addressed and coordinated into the long term needs for power consumption. It is believed the silviculture (the commercial growing of hardwood Eucalyptus plantations) will supply the permanent fuel needs for the life of any power facility. This supply will not become available for approximately 3 to 5 years and thus we will be required to rely on agricultural residues (biomass), for that short period of time on each project site. (Exhibit C)

The amount of crop residue produced in California is estimated to be in excess of 12.5 million tons; all of which was disposed of in some manner - by shredding and/or incorporation into the soil, burning, or by other means. Much of this residue could be converted into a variety of products, including energy. An important goal in the

planning of an industrial power facility is to minimize the delivered cost of raw materials. This involves siting the facility so that transportation costs of the raw material are minimized. Other factors also must be considered in a siting analysis, including environmental impacts, social impacts, financial incentives, and the proximity to natural gas and power grid lines.

The total delivered cost of wood energy is made up of collection, processing, storage, and transportation. Our research for an optimum transportation distance to provide tree prunings and whole tree harvesting shows to be under 35 miles of the plant site. Distances greater than this show a diminishing return when the transport made is by truck. The question of where to construct a biomass power facility and how big to make it, requires an examination of the delivery cost and availability of agricultural biomass. As the facility size increases, incremental delivered cost will increase because incremental transportation distance will increase. Biomass will have to be brought in from farther and farther away to satisfy the demands of larger power facilities. In general, the site with the lowest delivered cost is preferred, although other factors will affect the site selection. Politics often have as much impact on site selection as economics. However, if the economic feasibility of a site is not established, there is no need to begin the process of site procurement with all its political consequences.

Our experience in working with agriculture has shown that growers are willing to contract their agricultural residues to a power facility. The majority want short term commitments, usually under five years. With a more efficient plant consuming less fuel than most existing operations, **IED Inc.** can afford to pay enough for fuel to motivate individuals to process harder to get residues. Also, we do not look at our fuel suppliers as adversaries, but rather that they understand the problems associated

with processing fuel. Captive fuel has been the main source to date for most plants. Sources that have to be processed require more capital incentive equipment and manpower. Timing and logistical problems also increase costs.

Finally, looking at the long term fuel requirement, we are convinced that hardwood plantations of Eucalyptus will produce wood energy for the life of the power plant and answers the large variable required by lenders for "a guaranteed supply of fuel." We refer to these plantations as "energy crops." The term designates any agricultural crop which is grown specifically to replace a hydrocarbon fuel, especially oil.

The strong attraction of one type of energy crop has been its capacity to grow on marginal land. Eucalyptus is a hardy tree, capable of regrowth every 4 to 5 years, for periods of at least 50 years. It is our desire to put thousands of these marginal acres into production which are now sitting idle or a minimum use. Fuel farming can be an option and studies at the University of California show that profitability can be maintained on these types of operations. **IED, Inc's.** involvement with fuel farming will be to contract with growers to supply fuel for long term. The contract would specify number of acres, price and delivery date. If appropriate, **IED, Inc.** could develop their own fuel farming plantations as capital became available.

In conclusion, power facilities that can be sited with short and long term fuel guarantees will and can be successful. It is the biomass plan of **IED, Inc.** to site the following projects.

These projects are rated on a scale of 1-10; with 10 being the hardest and most costly to develop.

PROJECT #	LOCATION	PROJECT SIZE	SERVICE GRID	DEVELOPMENT SCALE
1	Lost Hills	9 Megawatt	PG&E	2
2	Victorville	9 Megawatt	Edison	5
3	Visalia	9 Megawatt	PG&E or Edison	4
4	Chico (Joint Venture)	18 Megawatt	PG&E	6
5	Salida	9 Megawatt	PG&E	6
6	Mendota (Joint Venture)	18 Megawatt	PG&E	7
7	Woodland (Joint Venture)	18 Megawatt	PG&E	7
8	Sacramento (Jt. Venture)	18 Megawatt	PG&E	8

It is the desire and plan of **Integrated Energy Development, Inc.** to develop site project #1 or a similar project of low development cost scale. The first project must have a high degree of success if we are to attract venture capital required to construct this and future power plants. A small development firm, such as **IED** has several advantages - one is better acceptability within the communities we will need to operate and efficiency not found in large multi-national firms.

FINANCIAL INVESTMENTS

There are several levels of financial investment required to complete a cogeneration power project.

Level #1

Plant siting; permits (range from negative declarations to full Environmental Impact Reports with a PSD Document to the EPA); Finalize fuel contracts; and obtain power sales contracts.

Level #2

Power plant construction financing, permanent takeout loans; venture capital investments; and fuel delivery systems.

Level #3

Eucalyptus plantation development as owner; and other alternative long term fuel plans.

Integrated Energy Development, Inc.'s business plan addresses and first level of siting, permitting, fuel contracts and power sales contracts. It should be understood

that the financial requirements to meet this level are estimates. Each project has to be judged on its own merits at the time of our evolvement. When dealing with government agencies, public utilities and others in the energy field, there are no hard and fast rules or guarantees that the financial investment will be as secure as a bank deposit.

INTEGRATED ENERGY DEVELOPMENT, INC. FINANCIAL PLANS

The principals of **IED, Inc.** have agreed that their experience, knowledge, and commitment to the firm is worth 65% ownership. The remaining 35% of the corporation stock would be exchanged for a cash investment of $500,000.

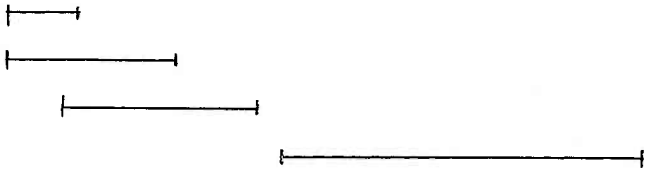
These funds would be used to develop power sites during the first thirty (30) to thirty-six (36) months. **IED. Inc.** would be generating its own cash flow during the third year of operations. There would be some income prior to this time from consulting fees and wood energy sales. The following are the estimated time lines:

TIMELINE IN MONTHS

1	4	7	10	13	16	19	22	25	28	31	34	37
3	6	9	12	15	18	21	24	27	30	33	36	39

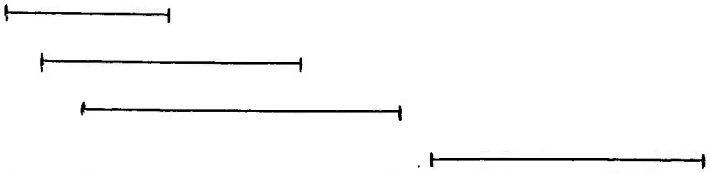
Project #1 -Estimated total project time: 26-30 months:

Preliminary
Permit Work
Air Quality
E.I.R.
Construction



Project #2 - Estimated total project time: 28-32 months:

Preliminary
Permit Work
Air Quality
E.I.R.
Construction



Project #3 can begin as cash flow from Project #1 justifies such expense.

The cost for **IED, Inc.** to maintain this project timeline should be met under the capital investment as follows:

ESTIMATES OF DEVELOPMENT COST

	PROJECT #1	PROJECT #2
Power Sales Contracts	$ 5,000	$ 5,000
Fuel Contracts	6,000	15,000
Permits (EIR, Air Quality, Site)	144,000	180,000
Salaries	55,000	55,000
Legal	4,000	4,000
Accounting	3,500	3,500
Miscellaneous	10,000	10,000
	$227,500	$272,500
TOTAL:	$500,000	

It is important to have enough cash flow to bring projects on line. Early power sales and other income would allow us to progress faster and to look at many other energy fields. These other areas could be ethanol production, methane fermentation, fruit drying, plant nurseries, and direct to consumer power sales.

KIRBY HAMMOND, SR.
959 Holly Avenue
Rohnert Park, CA 94928
(707) 585-1606

PROFESSIONAL BACKGROUND

Integrated Energy Development, Inc.
1984 - Present: Owner/Consultant
A Northern California corporation and sole representative of several biomass, geothermal and hydro projects.

Applied Power Technology, Santa Rosa, CA
1981 - 1984: Project Director
Job Duties: Provide on-site coordination and supervision of project engineers, planners and consultants. Coordinate all staff during project development. Work with State, Federal and County agencies on permitting, environmental issues, and public interest. Determined equipment processes and other site specific information to develop two large-scale biomass-fueled power plants (total cost of projects expected to be over $60,000 million). In charge of over twenty engineers, foresters, planners, attorneys, tax accountants and several other consultants.

Manager of Energy Program
Duties: Development of energy project (18 Megawatt). Duties similar to those provided for APT, above.

Manager of Fuelwood Processing Mill
Duties: Mill supervision of production and services provided by the mill, selection of all equipment, selection and coordination of personnel and other managerial duties. Set up automated mill to process packaged firewood for markets such as Safeway, Farmers Market, Lucky Market, etc. Sales in 1982 reached nearly $1 million. In charge of over 40 employees.

Sandia Laboratories, Livermore, CA
1969 - 1980: Staff Engineer
Job Duties: Set up a thin film prototype and feasibility laboratory. Developed processes and established optimum techniques. Evaluated and purchased equipment for laboratory. Design and project engineer on most incoming jobs, component evaluation. Liaison between contract winners and hybrid circuits and laboratory on method, technique and design.

Assigned to a special Top Secret project group studying and designing hardware and methods in deterring terrorists using nuclear material. Issued Top Secret Material Pass for handling military sensitive hardware in the field. Held Department of Energy "Q" clearance; held rank as Lt. Commander in Bay Area Reaction Force.

KIRBY HAMMOND, SR.

EDUCATION

Electronic Engineering Degree: 1968
DeVry Institute of Technology, Chicago, IL

INTERESTS

Hunting, fishing, outdoor sports, Karate.
Scout committee member (Outdoor Chairman)
Commercial Pilot with Single and Multiengine
Land Rating, Instrument Rating

MILITARY

1964 - 1966: U.S. Army
Training in electronics, demolition, Leadership
Preparation Course, NCO Academy, Vietnam tour,
Presidential Unit Citation - Battle of Ba-Bang.
Honorable Discharge

PROFESSIONAL AFFILIATIONS

Forest Products Research Society - Member
Independent Energy Producers - Member
Attended Biomass Energy Conventions:
  New Orleans: 1981
  Washington, D.C.: 1982
  Nashville: 1982
Attended the 5th World Energy Conference
  Atlanta, Georgia: 1982

JAMES J. JUNGWIRTH
P.O. Box 970
Hayfork, CA 96041
(916) 628-4521

PROFESSIONAL BACKGROUND

Integrated Energy Development, Inc.
1984 - Present: Owner/Consultant
A Northern California corporation and sole representative of several biomass, geothermal and hydro projects.

Jungwirth Consulting
1982 - 1984: Owner/Consultant
Identified and evaluated over 20 potential hydroelectric projects in Oregon, California and Montana. Conducted contract negotiations with landowners, developers, and financiers. Conducted resource availability analyses for two biomass projects in Northern California. Assisted in permit processes and public relations efforts.

J-3 Lumber Company
1979 - 1982: Owner/Consultant
Evaluated biomass feasibility in conjunction with hardwood processing plnat in Trinity/Humboldt Counties for a Sacramento development firm. Conducted production and quality tests.

Independent logging contractor, responsible for contract compliance, timber purchase and sales, timber harvest practices and quality control.

Native Sons, Inc.
1977 - 1979: Owner/Builder
Partnership participation in construction and ownership of 24-unit housing development. Loan applications and bank negotiations, land purchase and sales, development of government assistance loans and grants, journeyman carpenter.

Van Garrett Logging
1976 - 1977: Partner
Independent logging contractor, property bid surveys, timber cruising, timber felling and extraction activities.

Director Trinity County CETA Program
1975 - 1976
Implemented federal jobs training program, set up initial office procedures, implementation plans, acted as department head to County Board of Supervisors, conducted eligibility interviews, interfaced with various county departments and private companies for client placement. Responsible for preparing and accounting for over $1 million annual operating budget.

JAMES J. JUNGWIRTH

EDUCATION

Post Graduate work at California State University, Chico
Received Secondary Teaching Credential
1973 - 1975

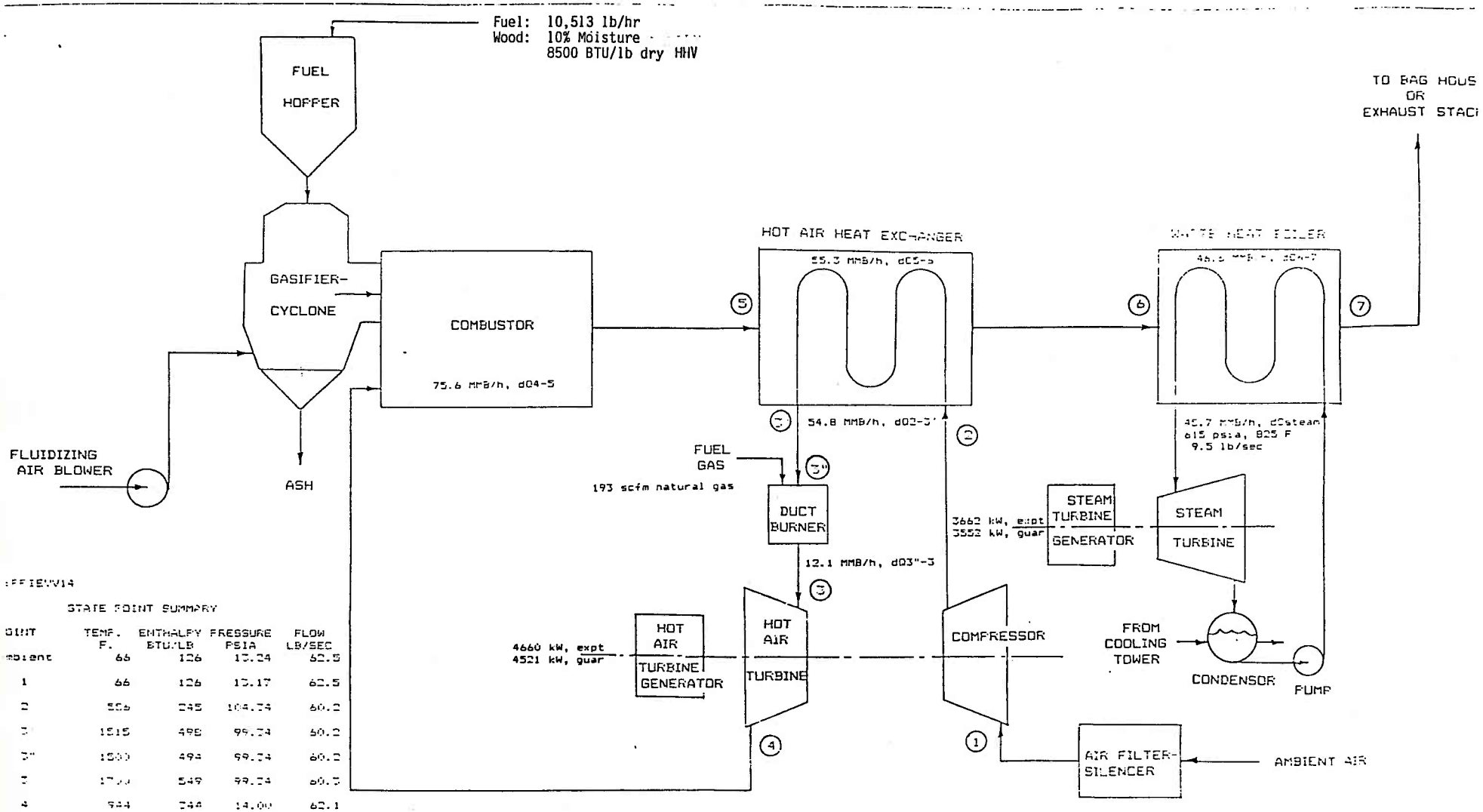
B.A. with Honors, CUS, Chico
M.A. English Literature, University of Oregon

MILITARY

U.S. Army
Received training in German language and military police investigations. Assigned as armed forces black-market investigator in Germany

REFERENCES

Available Upon Request



EFFIENV14

STATE POINT SUMMARY

POINT	TEMP. F.	ENTHALPY BTU/LB	PRESSURE PSIA	FLOW LB/SEC
Ambient	66	126	15.24	62.5
1	66	126	15.17	62.5
2	556	245	104.74	60.2
3	1515	498	99.24	60.2
3"	1500	494	99.24	60.2
3'	1700	549	99.24	60.2
4	944	344	14.00	62.1
5	1791	591	17.85	72.3
6	1042	378	17.67	72.3
7	771	199	17.42	72.3

8200 kw, expected net plant output power
7951 kw, guaranteed net plant output power
11262 BTU/kWh, expected net plant heat rate
11647 BTU/kWh, guaranteed net plant heat rate

FLOW DIAGRAM AND STATE POINTS HOT AIR TURBINE COMBINED CYCLE UPRATED 5820 HOT AIR TURBINE	CUSTOMER: INTEGRATED ENERGY DEVELOPMENT CORP.
MITSUI ENGINEERING AND SHIPBUILDING	DATE: 12-11-84