**PROPOSED DESIGN OF 500 MW COAL-FIRED POWER PLANT LOCATED AT BRGY. LUMANIAG, LIAN, BATANGAS**

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**EXECUTIVE SUMMARY**

The Philippines is a rapidly developing nation with an increasing population. Consequently, the country cannot overlook the vital role of the power sector in boosting its economy. We are at the age where electricity is of utmost importance and without it our civilization may not be possible. For that reason, different forms of energy are being converted into electrical energy through power plants to keep up with the country’s growing energy demands.

The proposed project focused on the design of a 500 MW Coal-Fired Power Plant located at Brgy. Lumaniag, Lian, Batangas. It occupies a land area of about 40 hectares and is owned by the AHHMS Power Corporation. The plant capacity was based on the increasing power demand of the country particularly in the Luzon grid. It is in a vacant lot distanced from the different commercial establishments and is strategically located near the Nasugbu Bay which serves as the source of water for plant operations.

There are three design options which were calculated and analyzed considering the technical, environmental, and economic constraints. Higher efficiency is preferable so as to meet the increasing demand. Among these, design option 3 was selected as the best design option as it gave the highest efficiency without sacrificing much economic viability.

Moreover, the power plant design and cycle basis, equipment specifications, economic analysis, and the plant design layout are included in the project. Engineering codes and standards, health and safety issues, environmental impacts, and political factors were considered in designing the power plant.

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| **LIST OF ACRONYMS/ABBREVIATIONS** | | | |  |
|  |  |  |  |  |
| **AF** | Air-Fuel Ratio | | | |
| **AH** | Air Heater | | | |
| **ASME** | American Society of of Mechanical Engineers | | | |
| **AST** | Ash Slurry Tank | | | |
| **BATELEC** | Batangas Electric Cooperative, Incorporated | | | |
| **B** | Boiler | | | |
| **BFP** | Boiler Feed Pump | | | |
| **BV** | Book Value | | | |
| **C** | Carbon/Celcius/Centigrade | | | |
| **Cb** | Unburnt Loss | | | |
| **CEP** | Condensate Extraction Pump | | | |
| **CF** | Coal Feeder | | | |
| **CFWH** | Closed Feed Water Heater | | | |
| **CH** | Crusher House | | | |
| **CHN** | Chimney | | | |
| **CO** | Carbon Monoxide | | | |
| **CO2** | Carbon Dioxide | | | |
| **COND** | Condenser | | | |
| **CoX** | Carbon Oxide Emission | | | |
| **CS** | Coal Silo | | | |
| **CSP** | Coal Stock Pile | | | |
| **CU** | Cooling Unit | | | |
| **CV** | Conveyor | | | |
| **CWP** | Circulating Water Pump/Cooling Water Pump | | | |
| **CWPS** | Circulating Water Pump Station | | | |
| **DRT** | Deaerator | | | |
| **DOE** | Department of Energy | | | |
| **e** | Efficiency | | | |
| **ECO** | Economizer | | | |
| **EG** | Electrical Grid | | | |
| **EIRR** | Economic Internal Rate of Return | | | |
| **ENPV** | Expected Net Present Value | | | |
| **ESP** | Electrostatic Precipitator | | | |
| **F** | Farenheit | | | |
| **FC** | Flue Gas Cleaning/Trap | | | |
| **FGTF** | Flue Gas Treatment Facility | | | |
| **FPBC** | First Bay Power Corporation | | | |
| **FNC** | Furnace | | | |
| **ft** | Feet | | | |
| **FWP** | Feed Water Pump | | | |
| **Gen** | Generator | | | |
| **h** | Hour/Enthalpy | | | |
| **H** | Hydrogen | | | |
| **HHV** | Higher Heating Value | | | |
| **hp** | horsepower | | | |
| **HP** | High Pressure Turbine | | | |
| **HR** | Heat Rate | | | |
| **Hz** | Hertz | | | |
| **I&C** | Instrumentation and Control | | | |
| **IDF** | Induced Draft Fan | | | |
| **IEEC** | Ibaan Electric Engineering Corporation | | | |
| **IP** | Intermediate Pressure Turbine | | | |
| **J** | Joule | | | |
| **K** | Kelvin | | | |
| **kg** | Kilogram | | | |
| **kg/s** | Kilogram per second | | | |
| **kg/hr** | Kilogram per hour | | | |
| **kJ** | Kilo Joule | | | |
| **km** | Kilometer | | | |
| **kPa** | Kilo Pascal | | | |
| **kV** | Kilo Volts | | | |
| **kW** | Kilo Watt | | | |
| **kWh** | Kilo Watt Hour | | | |
| **L** | Liter | | | |
| **Lfg** | Dry flue gas Loss | | | |
| **Lh** | Humidity Loss | | | |
| **Lm** | Moisture Loss | | | |
| **LP** | Low Pressure Turbine | | | |
| **m** | Meter | | | |
| **MPa** | Mega Pascal | | | |
| **m3/hr** | Meter Cuber per Hour | | | |
| **mf** | mass flow rate of fuel | | | |
| **ms** | Mass flow rate of steam | | | |
| **MW** | Mega Watt | | | |
| **N** | Nitrogen | | | |
| **NoX** | Nitrogen Oxide Emission | | | |
| **NGCP** | National Grid Corporation of the Philippines | | | |
| **O** | Oxygen | | | |
| **O&M** | Operation and Maintenance | | | |
| **P** | Power/Pressure | | | |
| **Pa** | Pascal | | | |
| **PAF** | Primary Air Fan | | | |
| **PC** | Pulverized Coal | | | |
| **PRH** | Pulverized Reject Hopper | | | |
| **psi** | Pounds Per Square Inch | | | |
| **PZR** | Pulverizer | | | |
| **Qa** | Total Heat added | | | |
| **Qb** | Heat added in the boiler | | | |
| **Ql** | Heat losses | | | |
| **Qrh** | Heat added in the reheater | | | |
| **RH** | Reheater | | | |
| **ROI** | Rate of Investment | | | |
| **s** | Second | | | |
| **S** | Sulfur/Stack | | | |
| **SD** | Steam Drum | | | |
| **SH** | Superheater | | | |
| **SL** | Service Life | | | |
| **SOX** | Sulfur Oxide Emission | | | |
| **SR** | Steam Rate | | | |
| **ST** | Steam Turbine | | | |
| **SV** | Salvage Value | | | |
| **t** | ton | | | |
| **T** | Temperature | | | |
| **TRN** | Transformer | | | |
| **TCI** | Total Capital Expenditures | | |  |
| **V** | Volume | | | |
| **W** | Watt | | | |
| **Wnet** | Net work Cycle | | | |
| **Wp** | Work of Pump | | | |
| **WS** | WorkShop | | | |
| **Wt** | Work of Turbine | | | |
| **WTP** | Water Treatment Plant | | | |
| **yr** | Year | | | |