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Outline of Proposal from Chinese Nuclear Industry 22nd Construction Company, Ltd. to the Government of Timor-Leste for Heavy Oil Power Plants and Nationwide Electric Grid Approximate date: June 2008

This document has been scanned, excerpted and reformatted from the proposal submitted by the China Nuclear Industry 22nd Construction Co., Ltd. (CNI22) to the government of Timor-Leste prior to the tenderization process for the National Power Plant and Electric Distribution Grid. La'o Hamutuk has tried to preserve the misspellings and typos in the original, but some additional ones may have been added.

We have not yet been able to obtain technical documents, contracts or engineering studies on the finalized project, nor information on the contract which was signed between the Government of RDTL and the CNI22 company on 24 October 2008. The actual project will differ from the company proposal in some details, including moving 30 of the 120 megawatts of generating capacity which was proposed for Manatuto to a third site in Hera.

La'o Hamutuk will continue to provide more information on our website as it becomes available.

La'o Hamutuk, 2 March 2009
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Outline of Proposal

1. The contractor will pay for the construction cost of the project Nationwide Grid and the employer shall repaid back to contractor after first half year of the construction started. More details of the payment please find in the proposal.

2. Contraction period

   For the main districts and the cities shall be lighting up on August 2009, and for the nationwide supply shall before August 2010.

   Detail list of the districts.

3. Electricity generation cost estimation and ROI in operation Calculated as 210g heavy oil per kWh, price of USD 450/ton FOB Singapore, plus manpower and maintenance cost as USD 0.09 per kWh. if there are yearly output of 600 million kWh and calculated as USD 0.21 per kWh, total investment for the power plant will be returned in 2 years.

4. Oil depot capacity and fuel oil reservation

There are three oil depots for the plant; total capacity of 12,000 m3 will guarantee the oil consumption for 45 days running.

5. Operation and management of Power Stations.

   The Contractor shall liable to provide free maintenance including full set of components and parts for 5 years after plant construction completed. Three plants are fully managed by Contractor and owner shall pay USD 3 million each year to the contractor. Meanwhile the contractor shall liable to trained 150 qualified technicians for the owner within 5 years.

6. The procurement and supply of the oil

   To guarantee the efficient and stable operation of the power plant, as well as oil quantity and quality, all oil such as heavy oil, engine oil shall be procured by the Contractor and paid by the Owner.

7. Economic guarantee of the Contractor on maintenance and management in 5 years after construction completion

   The contractor is liable to maintain and providing all components and spare parts in the plant valued USD 6 million. Meanwhile, provide a set of generator valued of 2.38 million for back up and guarantee. To ensure the normal running and maintenance, the contractor is liable to provide full set of maintenance equipments for free and build up a complete maintenance workshop. The back up generator and full set of maintenance equipment can be return or resell under negotiation of both parties when period of 5 years expired.

8. Considering of the difficulty of the construction we specially designed a giant special crane and conveyance ship to ensure project will run in the time and the lowest cost.

9. Price and Payment

   a. The total price of the design, engineering, construction, installation, and the equipment supplied (including raw, materials and grid and manufacturing cost of all projects):

No.	Project Name	Price	Note
1.	Plant	USD 91,038 377	
2.	Grid	RMB 1,885,300,000	About USD 269,328,570
	Total:	About USD 360,366,947	

   b. Warranty for 5-year operation and normal power supply guaranteed by the contractor.

   c. All amounts in the project shall be on the basis of US dollar and tax free.

   d. The contractor shall commence the work within two weeks upon the execution of the Contract.

   e. Method of payment is negotiable between both parties when the contract is being signed.

10. Construction Schedule

    10.1 The civil work progressment of the plant

    10.1.1 Construction of land flattening; installation of generator for temporary use, temporary worker's hostel, factory structure, macadam fabrication factory and parapet for the Manatuto Power Plant.

    Start work on August, 2008. Finished on October, 2008.

    10.1.2 Construction of the port and tower crane, basic civil work of the main factory and the 110kv booster station, office building and the worker's hostel.

    Start on August,2008. Finished on January,2009.

10.1.3 Construction of the jetty pier for oil and the tower crane of Manatuto Plant.

Start on November, 2008. Finished on January, 2009.

10.1.4 Construction of the two factories, one main generator foundation, 110kv booster station structure for the Manatuto Plant.

Start on January, 2009. Finished on February, 2009.

10.1.5 Civil works of the Manatuto Plant Oil depot.

Start on March, 2009. Finished May, 2009

10.1.6 Construction of plant land flattening, temporary use generator installation, civil work of the temporary use worker's hostel and parapet at the Same Plant site.

Start on October, 2008. Finished on December, 2008.

10.1.7 Construction of the Same jetty pier, basic civil works of the factory, 110kv booster station, office building, worker's hostel.

Start on January, 2009. Finished on May, 2009

10.1.8 Same tower crane installation and the construction of the jetty pier for oil.

Start on May, 2009. Finished on July, 2009.

10.1.9 Construction of the hoisting of the Same main factory, the 110kv booster station and the main generator foundation.

Start on July, 2009. Finished on November, 2009.

10.1.10 Civil work of the Same oil depot.

Start on October, 2009. Finished on December, 2009.

10.2 Operating planning for the Power Plant and the construction of the Power Transmission and Transformation.

10.2.1 The equipment installation of the first main factory, the booster station, the common public system and the tank manufacture.

Will start progress in January, 2009. Three generator will operated and supply the power in August, 2009.

10.2.2 The construction and installation of the 110kv double circuit and the switch station survey in between Manatuto-Dili.

Start on August, 2008. Finished in August, 2009 and operable.

10.2.3 Combination debugging for the three generator of the first group at the Manatuto plant, Manatuto – Dili 110kv double-circuit and the status of the power generation, transmission and the equipment for transformation in the Dili 110kv switch station.

In progressing on September, 2009 and done in same month to accomplish the grid are connected to the Dill plant and operable.

10.2.4 Test operating of three generator of the second group in the Manatuto Plant.

Finished installation on December,2009.

10.2.5 The Dili – Liquica 110kv power transmission and transformation line in operation.

Finished on December, 2009.

10.2.6 Manatuto 20kv central switch station and 20kv transmission trunk in operation

Finished on December, 2009.

10.2.7 Manatuto – Baucau 110kv power transmission and transformation line in operation.

Finished on December,2009.

10.2.8 Same power plant will start installation in October, 2009 and test operating three generators.

Finished on Febuary, 2010.

10.2.9 Same 20kv central switch station and 20kv transmission trunk in operation

Finished on February, 2010.

10.2.10 Same – Viqueque 110kv power transmission and transformation line in operation.

Finished on February, 2010.

10.2.11 Constructions of the 110kv switch central station and the 110kv South-North connection line and accomplish the nationwide grid connected.

Finished on February, 2010 and take over of the Dili plant. Officially start the 5 years construction period.

10.2.12 The three generators of the third group in Manatuto plant in operating.

Finished on April, 2010.

10.2.13 Baucau - Lospalos 110kv power transmission and transformation line in operation.

Finished on April, 2010.

10.2.14 The three generator of the second group of Same plant in operating.

Finished on August, 2010 and the completed the this phase construction.

10.2.15 Same - Suai 110kv power transmission and transformation line in operating.

Finished on August, 2010.

10.2.16 Same - Maliana power transmission and transformation line in operating.

Finished on August, 2010.

10.2.17 The three generators of the forth group in Manatuto plant in operating.

Finished on August, 2010 and the completed the this phase construction.

10.2.18 Whole nation shall electrify through the completion of the above power transmission line construction.

Finished on August, 2010.

The First Section

Proposal of Constructing Timor Leste Heavy Oil Generator Power Plant

For a country electricity is the one of the vital basic energies and the electrical industry consisted of power plants, transmission and distribution system and grids, is an infrastructure and basis for any others involved in economic, social construction and development. As a sort of public affair, it is also closely interrelated to people's life.

Timor-Leste is a new independent country although it has rich resources and simple and honest people, the Democratic Republic of East Timor is at the very outset of national economic construction, and up till now there is no a power plant in a certain scale, no national grid or regional grid. As per government planning, Northern area will focus developed as tourism area, and southern area will develop in recover petroleum, natural gas, mineral and etc. For the west Maliana is the 3rd major city in this nation and mainly produce food. Therefore, it is reasonable for us to consider electric power to be the basis, pillar, key role of national economy and regional economy.

As to develop this country Government of Timor-Leste decided to built a Heavy Oil Generator Power Plant and near term, Medium Term power system.

A. Before of the any proposal start have a overview of the below table:

Table 1: Comparison of diesel generator group and other generator group (100,00KW)

Items	Heavy Oil	Diesel	Wind Power	Coal	Solar energy	Water electricity
Investment (USD/KW)	1,000	1,500	4,000	2,700	8,000	3,300
Period (year)	2	2	3-4	4	3-4	3-5
Cost per kWh in operation (Cent)	0.09	0.17	0.03	0.08	0.02	0.02
Power (KW)	100,000	100,000	100,000	100,000	100,000	100,000
Cost return period (year)	4	8	10	8	Above 10	Above 10

Table 2: Few possible choice of the Heavy Oil Generator

No	Description	Quoted price (million USD)	From order to installed period (month)	warranty (yrs)
1	Brand new	280	24-36	1
2	Second hand with new facilities	92	8-12	5

According to the comparison above, we suggest that SECOND HAND with NEW FACILITIES should be adopted in Timor-Leste just now, because of Saving a lot of Money, especial lot of Time.

B. Constructing of the Heavy oil power plant

To guarantee the economic and the power running in wells in whole countrywide an electricity plant will built both on the northern line and southern line and making electricity plants as cores, separately from northern and southern electricity transmitting trunk lines. The connecting line will be built in the middle part of the country to connect the northern and

southern networks. According the requirement of the near midterm planning and layout, the Manatuto Electricity Plant on the northern line has dynamotor capacity of 120MW among the 60MW dynamotor will in production in the first half year of 2009 and 60MW dynamotor will be in production in the first half year of 2010. The Same Electricity Plant on the southern line has dynamotor capacity of 60MW. 30MW dynamotor will be in put into production in the first half year of 2009 and 30MW dynamotor will be in put into production in the second half year 2009. There will be 60MW expansion scale left in advance to the long term.

1. Manatuto Power Plant Layout

1.1 Plant Location

Manatuto Power Plant location is scheduled on sea margin which is 3km east to central area of the city, with hill of about 30M to the east, salt pans to the west, a hundred meters away from the Pacific links to the north, and the north line of Belt Highway to the south. About 200M of road left to be set up to enter the plant. Generally no housing estates exist within the range of 1.5km to the plant, but some farmlands and forests strewed at random between.

1.2 Plant Layout

1.2.1 Plant land coverage is 264M long from east to west, and 208M wide from north to south, in 54912 square meters. Going from north line of the Belt Highway, through south gate of the plant area, it is the central trunk road in the plant area, to the east of which is the Office Zone of the Power Plant, with about 2500 square meters of beautifying mini scenic spot before entrance to offices. Layout of the mini scenic spot in front of the plant is carefully designed, for impressive sightseeing, which is interfused into the overall environment of the Power Plant.

1.2.2 Office area is 480 square meters, in the local prevalent architectural style, monolayer, with pitched roof, and corridor of round columns. The Office area is partitioned into rooms for Director, Deputy Director, Production Engineering, Financial, as well as the Receptionist & Meeting Room, Laboratory Room, and instrument room, with high-end fitment.

1.2.3 To the east of the central trunk road are the main generator rooms 1# and 2# from south to north in the same pattern of steel structure, with each of 72M long, and 40M wide. Main generator room in crosswise transverse shall have main machine hall of 24M in the middle, about 18M high, equipped with 10^T bridge crane, while the 72M-long main generator room is supported in 9 spans, of 8M each. From south to north, 1#, 5# and 9# spans are servicing platforms, while 2#-4# spans are successively mounted with Generator 1#-3#, and 6#-8# spans mounted Generator 4#-6#. The six generators are uniformly in Sulzer Generator Sets 14ZAV40S.

Layout of 2# main generator room is the same as 1#, with type in Sulzer or PC-4. Configuration of 2# main generator room is for ensuring that the total capacity of both Manatuto Power Plant and Same Power Plant to be or over 180MW.

The electrical room of the main generator room is to the west of the main machine hall, with the auxiliary house to the east of the main machine hall, which layout is not cost-efficient considered from view point of installation, for the lengths of both the cooling water pipe of each set and the 10KV output cable from high voltage room to 110KV primary substation are greatly increased. in addition, a 200M trunk road of shall be constructed between the main generator room and the primary substation. Although more money is spent, it is quite favorable to beautifying the scenery in plant area and to decreasing influence of smoke emission and noise from the units upon Office Zone.

1.2.4 Hardly can freshwater in great deal be found nearby the plant site, and therefore

only seawater can be used for cooling of equipments during power generating. Considering the difficulty in pumping seawater, for purpose to shorten construction period of the Power Plant, it is decided to build a seawater reservoir in the plant area, which shall be of the same area as the area of a main generator room, with seawater to be through a head race channeled in. The reservoir and head race are designed based on water level at lowest tidewater. Marine sand in the seawater going in deposits in the head race and reservoir. Grid filtration mechanism shall be considered prevent sand from affecting power generation. Clean seawater flows from the reservoir into a 2000M^3 receiving basin. The pump compartment to the east of the receiving basin is semi-underground, with the bottom level to the same level as the reservoir bottom, so as to ensure all pumps running at positive pressure. In the pump compartment, there will be mounted not only the water-circulating pump, but also the fire service pump for whole of the plant, as well as the foam pump for oil depot. Seawater after cooling process of the units will be concentrated into a drainage channel to sea, set up close to the green belt of the auxiliary house. The distance between the discharge outlet and water inlet shall be no less than 100M.

Close between the seawater reservoir and the trunk road is a greenbelt of 17M wide, which is a reserve for future development of power generation by waste heat, as was previously taken into the layout of the scenic spot in front of the plant, and it will be the key point for beautification of the Power Plant.

1.2.5 To the east of the two main generator rooms, there are two 110KV primary substations covering the same land area as the main generator room, where equipments are mounted outdoors. In the previous scheme where there would be only one Power Plant, just two outlet lines were designed. But currently, based on the construction requirement of the Nationwide Power Grid, it will be increased into four outlet lines. The outlet tower can be set up on top of the hill to the east of the Power Plant, so that the plant area looks tidy and magnificent. Between the two primary substations, 20KV high voltage room is reserved for power supply to construction of power grid. The 20KV outlet cables are to be connected to the 20KV aerial transmission cable trunk line at outside of the fence of Power Plant to provide power supply to users nearby.

1.2.6 Oil depot is set to the west of seawater reservoir and the receiving basin, Where oil can be pumped directly from sea into the oil depot conveniently. Within the oil depot, two 3000 M^3 heavy oil tanks are equipped, together with two 2000 M3 diesel tanks. At the north-east corner of oil depot, there lies the workshop for treatment of heavy oil, where oil separators and so on are equipped. In the oil depot, it is also necessary to set up several 30-50 M^3 horizontal tanks for daily use, as well as grease tanks and sump tanks, etc. fire walls are set for the oil depot, ensuring no leakage out of the depot in case accidental oil leakage occurs in the largest tank in its maximum load. Touchup shall be carried out every time when inlet or outlet pipes or lines go through any firewall for the oil depot. The capacity of the diesel tanks shall be large enough to meet demand of oil for this power plant in running or down state, with certain consideration of truck forward supply to Dili Power Plant, and Same Power Plant in the south. When the circumstances permit, commercial operation can also be considered. These are also dealt with as the original Planning Proposal.

1.2.7 Living quarter lies at south-west corner of the plant area, covering an area of 5624M^2, to be designed and constructed per capacity for 100 persons. The building takes local prevalent architectural style, with pitched roof, and corridor of round columns. Dining hall is included. Each person shares averagely 6-8 M^2 of dormitory, where separate toilets are provided, with air-conditioning supply. In the community, recreation rooms and outdoor sports grounds are to be supported. The

living quarter is separated from the Office Zone, but connected with a byway.

1.2.8 Material Warehouse and the Servicing Workshop are to be formed in an **L** shape with the Office Building, facing respectively their entrance-exit gate toward the transversal trunk road. Each room is partitioned at 24M long, 12M wide, and 8M high, while the Servicing Workshop is equipped with 3T crown block. The layout of the Material Warehouse and the Servicing Workshop leaves the Office more undisturbed.

1.2.9 Each production area of the whole plant has a 6-8M ring road, with 5M or wider greenbelt on both sides. On seashore a simple dock is set, with one unpowered lighter pontoon for loading or unloading large equipments of hundreds of tons, or, when the power plant is put into production, they will be used for transshipment of oil products.

1.2.10 Fences are set for the Power Plant. Besides the south gate, there is a gate in the north for loading and unloading operation at seashore. Passenger arch bridge is set up for the seashore pathway across the seawater channel.

1.2.11 It is planned to dig wells for freshwater at spots in the thick forests to the southwest of the plant area, to be used as domestic water and for water used by waste-heat boilers. A water pot shall be set up on top of the hill to the east, where domestic water especially the drinking water is made through filtration and sanitization to get compliant with sanitation requirement.

1.2.12 The a forestation shall be arranged that, around the plant fence, local fast growing tree species are grown, while the other areas to be planted with blooming shrubbery seedlings teeming locally. The huge area of green belt beside the trunk road and in front of the Plant shall, if the circumstances permit, be planted with grass. Surface soil shall be changed during plantation, with sufficient freshwater irrigation.

2. Same Power Plant Layout:

2.1 Plant location

Same Power Plant location is scheduled near the bay of Same district in the south. It is hillside to the north and the south line of the Belt Highway is to the south of such a location, several hundred meters to the reach of Indian Ocean Bay Sand Beach.

2.2 Plant Layout

2.2.1 Plant land coverage:

There is a double-trunk tree about 30M away from the highway and the plant will start 15M to the east of that tree, and will extend northward along the center of the trunk road for 118M. In both east and west directions it will extend for 212M, to make land coverage of 25016 M^2. This Phase shall cover a layout of one 60MW plant and primary substation, cooling basin, oil tank, office zone, and living quarter. Reserve control area is the area 20M further northward to the east of the trunk road, and 96M extension of the plant area to the east, which come to a total area of 15008 M^2, which is not to be requisition of land in this Phase, but recommended for the government to keep for further extension of the 60MW Power Plant.

2.2.2 To the east side of the north-south trunk road after entering the plant gate, the Office Zone will be set up, with office area of about 340 M^2, in the local prevalent architectural style, monolayer, with pitched roof, and corridor of round columns. The Office area is partitioned into rooms for Director, Production Engineering, Administration & Financial, as well as the Receptionist Room, Laboratory Room,

and instrument room, with high-end fitment.

2.2.3 Close to the north side of the scenic spot in front of the plant area, it is the joint building for the Material Warehouse and the Servicing Workshop, which is totally 48M long, 8M high, and 8M wide, with the Servicing Workshop equipped with 3T crown block. Windows for the Material Warehouse and the Servicing Workshop will be opened only to the north, so that they protect the Office Zone and living quarter from machine noise.

2.2.4 What to be built opposite to the Servicing Workshop on the other side of the road is 36Mx24Mx2.5M unit cooling basin. Based on the rainy geographical environment with abundant and luxuriant broadleaf forest, it is planned to dig well of large diameter for water supply. The capacity of cooling basin with freshwater is 2000 M^3. On top of the cooling basin, six 500-600T/H cooling towers made of square glass shall be mounted, with each for one main generator.

2.2.5 Inside the plant area, to the east of the south-north trunk road, are areas for power generation and power supply, where the main generator room and the 110KV primary substation are combined in one building. At the north end of the main generator room where is close to the north fence, auxiliary house and the boiler platform chimney are set. At the south end facing the Indian Ocean, it is the primary substation, with 110KV outlet line along the south line highway to be extended respectively eastward and westward. Reserve control area is the area 20M further northward to the east of the trunk road, and 96M extension of the plant area to the east, which come to a total area of 15008 M^2, on which another 60MW capacity can be set up. This area is not to be requisition of land in this Phase, but recommended for the government to keep it not for other purpose.

2.2.6 Living Quarter is set to the west of the Office Zone, covering an area of land in 2772M^2, with a capacity for 70 persons, average 8 M^2 per person. Dining, hall and recreation facilities are under uniform consideration.

2.2.7 The oil depot is set at north-west corner of the plant area, which is close to the scheduled temporary dock, for convenience of oil loading and discharge. In this Phase there will be two 3000M^3 heavy oil tanks, with a third one reserved to be set up. Within the oil depot area, some 30M^3, 50M^3, and 100M^3 horizontal or vertical diesel tanks, grease tanks and heavy oil tanks for daily use and sump tanks will be set. Fire dikes are set within the oil depot area, to prevent oil leakage out of the depot in case of accident. Separator house for treatment of heavy oil is set at the north-east corner of the oil depot, which supplies oil to main generator room by pipes and conveying mechanisms.

2.2.8 Each production area of the whole plant has a 6-8M ring road, with turning radius no less than 12M for smooth passing of large vehicles, and 5M or wider greenbelt on both sides. Surrounding green belt to the south of the primary substation is 11M. The 110KV outlet line tower is suggested to be set inside the fence.

3. Heavy oil engine:

3.1 The Heavy Oil Generator is French patent product is one of the widely used and best model for power generation in the world. SULZER machine set is produced in France and PC machine is produced in Japan. The machines are not oftener use and basically in the situation of stop production and standby state. The provided machine set can be run continuously at the rated power of 80%-85%. The seller can be responsible to operate, manage and warranty for several as per requirement of buyer.

Rotation speed of SULZER machine set is 500 turns per minute, four-stroke, 7 units

of 14 cylinders, 2 units of 16 cylinders, average cylinder diameter is 400mm, piston stroke is 560mm and weight of whole machine is 119 tons and 132 tons.

Rotation speed of PC-4 machine is 428 turns per minute, four-stroke, 10 cylinders, cylinder diameter is 570mm, piston stroke is 570mm, and weight of whole machine **is** 210 tons.

Rotation speed of PC2-6 machine is 500 turns per minute, four-stroke, 5 units of 18 cylinders, 1 unit of 16 cylinders, cylinder diameter is 400mm, piston stroke is 520mm, and weight of whole machine is about 150 tons.

The three type of machine are separable for transportation and also are reassembling after reaching construction site. It would be easier reassembling it with 100 tons separated. It not suggestible separated the machine to too light.

3.2 15 units of the generator sets for configure with heavy oil engines are original products from the origin countries and adopt brushless excitation. The 3 units of generator sets (for configure with PC-4 machine) are made in China and adopt silicon controlled excitation and connect with heavy oil engine with the flexible coupling.

3.3 Auxiliary system:

Each of the main generator would be provided with matching supercharger, air cooler, lubricating oil pump, lubricating oil filter, lubricating oil cooler, lubricating oil separator, high temperature water cooler, high temperature water pump, turning gear and other auxiliary equipments. All is basically original equipments imported from foreign country.

3.4 Public system facilities:

3.4.1 Fuel system equipments are included oil treatment workshop that made up of various heavy oil separators (to be confirmed by the design and calculation) 400 tons daily oil tank, various transportation pumps, transfer pumps, and etc.

3.4.2 Cooling water system:

Provide each unit machine set with one brand new glass reinforced plastic square counter-flow cooling tower, in accordance with the machine set con

3.4.3 Heavy oil engine discharge and exhaust heat utilization system: Each machine has independent flue, install the exhaust heat boiler with 0.5~0.75 tons of steam volume and steam pressure is 0.6Mpa and independent chimney. The boiler should adopt the new purchased equipments. For the normal use of matching exhaust heat boiler and heating system, it also provides two sets of softened water beds and other chemical water treatment equipments and feed water pumps, steam drums, gas-distributing cylinders and various sets of thermal matching equipments.

3.4.4 10kv power distribution system: Provide vacuum or SF6 oil-free switch, high voltage switch cabinet is assembled, tested, packed and exported by the factory.

3.4.5 110kv booster station: In accordance with the known system conditions, it is recommended to use 110kv booster system; the quotation is also considered 110kv booster output. 110kv main connection adopts sectionalized single-bus, 110kv Section I is connected to three 31500kvA booster main transformers of Unit One, Workshop A, Workshop B and Workshop C, 110kv Section II is connected to three 31500kvA main transformers of Unit Two, Workshop A, Workshop B and Workshop C, feed power to outside in two ways and install the bus coupling switch.

110kv transformer substation adopts outdoor device; each power generation unit

machine set feed power to the booster station using 10kv under ground cables; booster transformer substation area is equipped with the partition fence.

3.4.6 Compressed air starting system: Each main workshop is configurated with air compressor and high and low pressure gas storage tanks, provide standby according to the requirements of reliability so that ensure heavy oil machine set can be regulated according to the load, start and stop gas consumption during the operation and overhaul.

3.4.7 Central control and protection system:

Design and make all kinds of control equipments newly; introduce new monitoring technology; each workshop has independent DC system and is configurated with storage battery set; the equipments and wiring adopt microcomputer protection and are widely used the digital display; 110Kv outlet metering watt hour meter adopts multi-period and multi-function new type watt-hour meter.

3.4.8 Factory power consumption system equipments:

Provide one 800~1000kvA factory power consumption and distribution transformer for one machine set unit; provide low voltage system that decreases the voltage from 10kv to 400v/220v for drive and lighting of the whole factory; each unit of low voltage system includes low voltage switch cabinet, power cabinet and other equipments, mostly provides new China-made products.

3.4.9 Fire protection system:

Install the fire protection pumps, foam fire protection pumps and fire protection pipe network system of the whole factory; there into, oil depot area is configurated with the foam fire protection system.

3.4.10 Security power supply:

Install one 500kw new China-made Cummins generator set in Workshop A and Workshop C respectively and use diesel oil as raw material. Outlet of security generator is connected to factory power consumption system, and is sent to each machine set through the connection cable so that ensure two machine sets of the whole factory can be started at the same time and the machine set of power plant also can be normally started to generate electricity without external power supply. The security machine set is also the construction power supply during the capital construction period.

3.4.11 Lighting engineering:

According to the production need, install the outdoor and indoor lighting in the production and office area using Chinese advanced energy saving lamps and give attention to attractive appearance; install the emergency lighting lamps on the important production sites.

4. Contents of contracting projects:

4.1 Contracting scope:

4.1.1 Engineering design: Include preliminary design and construction design:

Include the professional design for all the civil engineering and electromechanical installation engineering comprising the bounding wall of factory site, but not include the designs of roads, docks, oil depots, power supply and , water supply engineering’s except for the bounding wall.

4.1.2 Contract for labor and materials for all the civil engineering projects of power plant, include all kinds of workshops, office buildings, ponds, trenches and road network, all kinds of buildings, bounding walls, fencing, and etc. of equipment foundation structure, concrete structure and steel structure.

4.1.3 Provide all kinds of electromechanical equipments and installation materials, include installation materials and consumable materials, also include the part that necessary for full production of completing the power plant but haven't listed in the bidding document yet.

4.1.4 Be responsible for the disassembly, ordering and packing of the equipment materials and construction machines in China site and then ship to the power plant in East Timor.

4.1.5 Be responsible for the installation, debugging and commissioning of all the electromechanical equipments in the whole power plant; be responsible for supplementing the consumed or damaged parts during the installation and debugging of equipments.

4.1.6 Be responsible for laying and installing all kinds of pipes, cables and electrical wires during the installation of power plant, making, installation, heat preservation and anticorrosion of large oil storage tanks and all kinds of tank bodies, frames and components.

4.1.7 Be responsible for the starting and commissioning of machine set, compiling the starting scheme, is responsible for the operation and adjustment.

4.1.8 Be responsible for the travel charges, salaries and living expenses of construction and management personnel in China and outside China during the construction period. The contracting units should be responsible for paying Chinese government all kinds of taxes and dues and insurance premium incurred in China.

4.1.9 Be responsible for the operation management and overhaul maintenance of construction power generation during the construction period.

4.1.10 After the owner provide the required land for the power plant, conduct the leveling on the factory address rapidly and provide geological exploration and hydrological data.

4.1.11 Be responsible for designing and constructing all the roads, docks, oil depots, power supply and water supply lines except for the bounding wall and building of staff dormitories and other life facilities.

4.1.12 Be responsible for the storage, installation, unloading and transportation expenses for all the electromechanical equipments, construction materials and machinery from goods collection site of China port to the construction site of power plant.

4.1.13 Provide electricity and power or diesel oil for self power generation during the construction period.

4.2 The owner should be responsible for:

4.2.1 The owner should be responsible for paying salary to the training personnel.

4.2.2 The owner should be responsible for purchasing the furniture, vehicles, office supplies and daily products of power plant.

4.2.3 After the commissioning and putting into production, the owner should be responsible for supplying all the oil products required for power plant, include heavy oil, diesel oil, lubricating oil, and etc. and take on all the expenses incurred.

4.2.4 Be responsible for ail the import and export customs duties of the project and equipments, include all kinds of expenses for paying local government when the seller assigns the labors (the seller should be responsible for the first labor entry visa fee).

4.2.5 The owner shall be responsible for transacting the entry permit and work permit of the seller.

4.2.6 Be responsible for the security work during the project construction and production of power period.

4.3 Time limit:

4.3.1 After signing the contract and receiving the advance payment, the contractor ensure that the first machine set can generate electricity within eight months; the whole power plant can reach full 100,000kw power generation operation 18 months after receiving the advance payment, and all the equipments can be completed the installation and put into production within three months.

The owner should provide 8 hectares of land for building a power plant without pay according to the design requirements.

4.3.2 The owner should pay progress payment in time according to the contract; otherwise, the seller should not liable for time limit delay.

4.4 Quality, technical standard and acceptance:

4.4.1 The second-hand equipments provided by the contractor are used in China and conducted the major repair and renewal so that should accord with the requirements of power generation.

4.4.2 Except for main and auxiliary units and other main equipments, a large number of electromechanical equipments provided by the seller are new China-made equipments and materials, should accord with Chinese current technical standards; electrical equipments should accord with International Electro technical IEC Standard.

4.4.3 The design, construction and installation taken charge by the contractor should accord with China national standards or the relevant China industry standards.

4.4.4 Test standard of machine set production is continuously running 72 hours driving 80%~85% power after each index parameters of site installation and debugging for each machine set are qualified. If 80%~85% forced continuous operation can’t be implemented due to the system, 80 hours of normal operation can be informed that the acceptance is qualified.

4.4.5 The contractor ensure that oil consumption of each machine set according to the metering of power generator exit meter and run at 80%~85% power is 210 grams/kwh±3%; realize the same proportion of reward or punishment for the part that exceeds or lower than index range, conduct the check one by one; if every gram exceeds or decreases in oil consumption index, RMB 10,000 will be punished or rewarded; the punishment or reward will be double for the part that exceeds or decreases over 5 grams.

4.5 Contracting for power generation, repair, training and other technical services:

4.5.1 From the date of putting into production of each machine, the contractor should be responsible for operating, examining and repairing for five years. Within five years of warranty, the contractor shall be responsible for all the travel charges, labor cost and overhaul expenses of operation and overhaul personnel of the seller, standby

materials charges during the production and overhaul. Since the time of putting into production of machine set is not identical, the starting time of five-year warranty period should be calculated according to the weighted mean method of putting to production of machine set.

4.5.2 The contractor should be responsible for providing the user's manuals for heavy oil engines, generators, transformers and other main equipments, be responsible for compiling the relevant operation and overhaul regulations of power plant.

4.5.3 The contractor should be responsible for the production training of owner employees of power plant and arranging the follow-up study and work make the local workers on duty basically within three years.

4.5.4 The contractor should, ship a certain amount of equipments and spare parts for timely replacement with the ship. Unused part should be transferred to the power plant without raising the price when the warranty period is completed and will not continue the contract.

4.5.5 After the contractor construction is completed, the residual materials and machines should be transferred to the owner at the original price or discount according to new and old condition, the construction machine should be transferred or the contractor should be responsible for shipping back to China port.

4.5.6 Within five years of contracting operation and maintenance period, the contractor should be responsible for purchasing, safekeeping and transportation of oil products; the owner should be responsible for the expenses.

5. The difficulty of the work progress.

Through the inspection had done there are some difficulty are face in the work progress.

5.1. The topography of the central mountain range increase the difficulty of the survey and the transmission line laying.

5.2. Dense forest also is an obstruction for the transmission line laying.

5.3. The villager and houses are scattered. It increased difficulty to electrify to those areas.

5.4. The lower weight of one generator is 150 tons. Therefore below is the infrastructure work needs to:

5.4.1. Built an standard port at coast of both Power plant site

5.4.2. Loaded port and the vessel shall compound with suitable crane.

5.4.3. All the road and bridge from loaded port to the factory have to renovate extensively.

5.4.4. Addition of the giant transportation are needed. Exp : big truck or vehicle and the light rail.

5.5. Without the all basic processing works, ail the maintenance of the works facilities would be problem.

5.6. Ours consideration: The main problem will be facing in this project is how to convey those giant equipment and the materials in the soonest time and built no bridge and with lowest cost. For this reason we work in this below purpose:

5.6.1. Design a special sling cart. Speak from expert: This will be the only sling cart with this special technique and function in the whole Southeast Asia.

5.6.2. Redesign a vessel for the conveyance and reform it as an oil carrier in the future.

6. Overall construction arrangement

6.1 Chapter One Establishment specification

6.1.1 Section One Basic of Establishment

1). Basic of establishment

- Facilities datum
- The initially design plan for the protect

2). Execution standard and rules

- Follow the common execution standard and rules.
- Others related rules construct and examined technique are issue by the construct country.
- Follow the newest standard and rules.

6.1.2 Section Two Principle of Establishment

1). Rigorously follow the construct country, local, company's technique standard, construction rules and quality evaluation and examined standard.

2). Persist in use the latest technique skill, rationalization of science, economic able and practical able.

6.1.3 Section Three contents of Establishment

Contents of construction:

Civil work of the main factory, cooling system, floatable water pumper, control tower included reservoir and water tank, circular water pump room included control room, transformer engine room, circular water pipe, central control room, assisting equipment work shop, oil topping room, assisting building and oil unloading device, all basic facilities, administration office, circular water pipe foundation and supporter, construction of pipeline, power grid ditch, ventilation and air-conditioner, electrical and lightning, indoor water system, others civil works, water supply system, kennel, drainage system included all draining progress. Construct the tower of 110kv power transmission line and line located, purchase equipment ad installation.

Temporary building: July to September, 2003 built simple jetty, worker hostel with bawn, storehouse, road from jetty to factory and dig well for supplying daily use water.

6.2 Charter Two Summarization of the Construction

6.2.1 Section One Synopsis of the construction

Project: 110KV transmission grid and oil generator power plant Construct locale: Democratic Republic Timor-Leste

Section Two The trait and the difficulty of the construction

Overall of the brief design and the synopsis of the construction, below is the difficulty will be facing:

The installation of the equipment is the major purpose. The process of the civil

works operated according of the equipment installation, debugging of the equipment and running situation of the equipment. The work load of this construction is heavy and time period is short (in between interlude with facilities installation). There will face some difficulty when laying the transmission grid and built power tower on the mountains and in the dense forests.

6.2.3 Section Three The aim of the environmental protection and the civilized

Rigorously follow < The rules of the civilized construction and assessment of the power construction> and safety civilized construction management. To ensure the environment stay in green situation and completely eradicate the pollution.

6.2.4 Section Four The aim of the work period.

One generator would operate on May 20, 2009 and all construction would finish on May 20, 2010. The civil works, equipment installation and the transmission grid will work accordingly.

6.2.5 Section Five The overall of the construction arrangements

This construction is compose by over ten different unit part and six major system that is heating power system, water disposer system, water supply system, electrical system, electric grid system and auxiliary production program. The constructions are work according the below mode:

A. The working procedure

The working procedure progressing in the format of: first done with underground work after with on ground; done in civil works after with installation; done in major constructing after with protect maintenance; done in structure after with renovation.

Stage one: Heating power system (that is main factory room, auxiliary building and basic facilities);

State Two: Water disposer system and its following work;

Stage Three: Water supply system and its following work;

Stage Four: Electrical system and its following works;

Stage Five: Power grid system and the design, the tower, transformer station and others unit parts;

Stage six: Auxiliary production program and its following works.

The arrangement for the, civil works, exp: main factory, grid civil works and the tower build will done in earlier and for the steel structure and the auxiliary part will purchase and done it separately. Equipment disassembles, encase, conveying and purchase of the accessory will work it accordingly.

B. The selection for the civil works

1). Vertical or horizontal transportation machine: Truck crane, material elevator, dump truck.

2). Stool select: wood stool

3). Mould select : Wooden mould

4). Concrete work: progress in the construct site

C. Fabrication and transportation of the semi-finished equipment.

1). The making of the steel structure: All the major steel structure will be fabric in the professional steel structure fabrication factory and carried

and reassemble it at the construct site. The simply steel structures will fabric at the workshop, to ensure miniature steel and all structure work in progress.

2). Wooden article fabrication: built workshop on the site and make when needs.

D. Major Engine collocation

According the trait of the design provide the suitable machine. For details of the equipment, see the plan of the major engine.

6.3 Chapter Three the layout of the construction

6.3.1 Section One Layout of the construct site

Consider of the plane layout of the factory area, geologic problem, the transportation in the factory area and etc will arrange the work according the actual situation.

6.3.2 Section Two Layout of the living area

This construction included two major functions:

First created a comfortable living area to fulfill the daily needs of the management and the operator so that they can fully throw oneself into their works.

Second built an office for the conductor of the construction.

A. Facilities for living hood

Built a temporary building to supply workers daily living, exp: housing, dinning area, bath room and etc.

Built the portable house as the office for the construction period office.

B. Surfacing of the road.

Abide by the rules combination of temporalize and permanency. Fully extended the permanency road in the area of factory and extend the temporary road in needs.

The layout of the temporary road will be cover with reduced stone.

To ensure the roads are able to take the weight of the transportation truck, the road in the factory area will leveled and cover with reduced stone.

C. Power require

Provided two oil generators to fulfill the needs of the construct period.

D. Water require

Well drilling at the constructing site to provided construction needs, daily use and extinguishing and protection.

E. Drainage of the construction site

Built drain at the both side of the real and construction site.

F. Communication

Office asset included one fax machine.

Cellphone for the management and technician

High frequency wireless walkie-talkie conveniently for giving instruction.

6.3.3 Secion Three The engine

A. Layout of the freight elevator

Provided one 40T crane and one 25T crane to fulfill the needs.

B. Ground work engine

Provide one unit 1m3 hoe shovel and two unit self-discharging truck vibratory road roller.

C. Concrete work machine

1). Layout of the concrete stirring mixer

Installed an 25m3/h concrete mixer station included with one unit of type 500 downwards concrete mixer and one unit of self adjusting machine.

2). Concrete conveyor.

Two unit on conveyor to ensure of the supplementary of the concrete needs in the construction.

3). Others: 5 units of pan vibrator and 20 units of plug-in concrete vibrate cudgel.

D. Other engines

Exp : steel fabricator, wood fabricator, steel structure fabricator and etc.

6.3.4 Section Four Labour force

Refer to our company previously experience the manpower shall distribute according the progressing of the construction and work out the dispatch worker table, labour force bar chart as to fulfill the labour needs on the spot whever the there changes or demand.

7. Payment

7.1 This proposal uses USD as the standard money calculate price.

7.2 The employer shall pay to the contractor 10% -15% as per project payment when contract signed.

7.3 The employer shall pay to the contractor 40% as per project progressing payment before January 15, 2009.

7.4 The employer shall paid another 40% to the contractor as per project progressing payment before January 15, 2010.

7.5 The remaining 10% shall pay after the project completed and check and accept.

7.6 The management fee shall start to pay a year after the generator in operation.

Book of Engineering Estimate

1. Costs of Civil Works (Unit: USD)

No.	Project Name		Number	Unit	Note
1	Office		640	m^2	Including decoration and air-conditioning
2	Major Factory Building		8,640	m^2	
	Which	Mainframe Room	5,184	m^2	Have 24 spans, 18-m high, and a set of overhead traveling crane.
		Auxiliary Engine Room	1,728	m^2	8-meter high, there is a overhead traveling crane.
		Electric Factor Building	1,728	m^2	The central controlling room is decorated, and is equipped with air-conditioning and cable contained raised floor.
3	Maintenance & Overhaul Workshop		576	m^2	8-meter high, 12-meter length of span, and a overhead traveling crane
4	Warehouse		1,152	m^2	Two floors, 12-meter length of span, 5-meter height of the first floor, and a traveling crane.
5	110 -KV Booster Station		3	set	9,600 square meters in total, six main transformers, two sets of buscouple, eight outgoing lines and 20 intervals with 110 KV, including structure, base, ditches, matscreen, oil reservoir and so on.
6	Two Cooling Tower Pools		1	set	Concrete structure of pool base, sides and upper base for tower installation, which is considered to be a dual floors of reinforced concrete structure at the price of 3,000 Yuan//m^3
7	Two Pump Houses		288	m^2	Semi-underground-type, style, 5-meter high, a small traveling overhead crane
8	Oil Processing Workshop		384	m^2	6-meter high, a small traveling overhead crane, installation platform, and underground oil pool.
9	Oil Depot Area		2	item	7,750 square meters, Armored concrete firewall of 200 m^3 , Ground floor of 387 m^3
10	Equipment Base		8,000	M^2	Including all equipment bases and oil tank base
11	Roads and Terraces		16,000	M^2	
12	Enclosure		1,604	M	3-meter high, including four stainless steel strobes and a duty house.
13	Seawater Cooling System		1	set	

2. Two Equipment Purchase Costs:

2.1 Brand new set generator (Unit: USD)

No.	Equipment or Project Name	Quantity	Unit	Unit Price	Total
1	Brand New Set Of Diesel Generators	180,000	KW	500	88,000,000

2.2 Secondhand Set Generator (Unit: USD)

No.	Equipment or Project Name	Quantity	Unit	Unit Price	Total	Note
1	19 Sets of Secondhand Diesel Generators	180,000	KW	25	4,500,000	Including diesel engines, generators, auxiliary equipment, etc.
2	Depreciation Cost of Mainframe	19	Set	115,181	2,188,440	
3	Mainframe Overhaul Cost and Costs of Standby Wares	19	Set	691,105	13,131,000	One year warranty after repair
	Total Price				19,819,440	

2.3 Brand New Equipment Purchase Cost (Unit: USD)

No.	Equipment or Project Name	Quantity	Unit	Unit Price	Total	Note
1	Mainframe Packaging Cost and Cost of Transport to the Port	19	Set	113,002	2,147,040	
2	FBNG Square SMC Cooling Tower 500-600 t / h	6	Set	119,280	715,680	
3	Cooling Water Pumps and fire-fighting pumps, etc.	2	Batch	390,000	780,000	
4	10-KV High-voltage Power distributing Devices	85	Set	24,300	2,065,500	
5	HRSG, 0.5-0.75t h	18	Set	48,600	874,800	
6	Water carburetor, jack engine of boilers	3	Set	145,900	437,700	
7	Compressed air starting device	3	Set	72,900	218,700	
8	Central control protective equipment	50	Set	24,300	1,215,000	18 sets of generators, 6 main of sets transformers, 6 sets of plant used transformers, 8 outgoing lines,
9	220-KV DC System	3	Set	175,000	525,000	Including charging panel, accumulator battery, and, DC distribution panel
10	Plant used Transformer	6	Set	48,600	291,600	
11	Low-voltage system devices, switchgears and power screen, etc.	6	Set	145,900	875,400	
12	31500 KVA 110/10 KV Main transformer	6	Set	1,118,600	6,711,600	
13	110 Kv SF6 Switch	16	Set	129,690	2,075,040	
14	110 KV PT One-off Equipment	90	Set	9,700	873,000	Priced at average price, including PT, CT, disconnecting link , lightning arrester, main transformer neutral protective equipment, trap, and coupling condensers.
15	3 x 300 mm_2 10 KV Power Cables	3,000	M	389	1,167,000	6 loops, each factory building for 2 loops, and each loop comprises 3 paratactic cables.
16	10T/24 Traveling Crane	3	Set	243,160	729,480	Including rails of 432 meter and etc.

17	3T/8 Traveling Crane	9	Set	48,632	437,688	Including rails
18	Seawater Pumps and Piping are Increased	12	Set	145,900	1,750,800	
19	20KV Equipments For Power Supply System	24	Set	119,280	2,862,720	
20	20/10KV Primary Substation	2	Item	390,000	780,000	
21	Same Main Transformer Changing Into Three Coils	2	Item	390,000	780,000	for 20KV Direct Supply
22	Total Price of Equipment				28,313,748	

2.4. Full Set Brand New Generator and Equipment Purchase Price (Unit: USD)

No.	Description	Price	Sub-Total
1	2.1 Brand New Set Of Diesel Generators		88,000,000
2	2.3 Brand New Equipment Purchase Cost		28,313,748
3	Equipment Freight and Miscellaneous Charges	1,16,313,748 X 5%	5,815,687.40
	Total Price		122,129,435.40

2.5. Full Set Secondhand Generator and Brand New Equipment Purchase Price (Unit: USD)

No.	Description	Price	Sub-Total
1	2.2 Secondhand Set Of Diesel Generators		19,819,440
2	2.3 Brand New Equipment Purchase Cost		28,313,748
3	Equipment Freight and Miscellaneous Charges	48,133,188 X 5%	2,406,659.40
	Total Price		50,539,847.40

As the table show there is a big different in between the two generator set no matter the price or the time. So our company strongly recommends government Democratic Republic of Timor-Leste use the secondhand generator. For all our price also quoted base on the secondhand generator.

3. Installation Costs (Unit: USD)

No.	Project	Qua-ntity	Unit	Unit Price	Total Price	Work Contents and Contacted Range
1	Generator Unit	19	Set	545,684	10,368,000	Installation, commissioning and trial run of diesel engines, generators, auxiliary equipment, support equipment, maintenance pipelines and electrical equipment, including all equipment, various consumption materials and procurement costs of such materials, assembly, renovation, painting, thermal insulation, Contracted labor cost, material cost, construction cost, cost of commissioning, etc., but not including those that are listed in the Costs of Equipment Purchase.
2	110 KV 31500 Main Transformer installation	6	Set	152,112	912,675	Main transformer and the phase 1 faculties and Phase 2 facilities take place, and they are installed, regulated, including the installation materials of porcelain insulators and generatrixes.

3	110 KV Busbar and Outgoing Equipment	10	Loop	76,055	760,550	Switches, disconnecting links, CT, PT, lightning arresters,generatrixes, traps, coupling capacitor and so on, the devices in the Phase 1 and Phase 2 are installed and regulated, including the installation materials of porcelain insulators and generatrixes
4	Oil Tank Manufacturing	180	100 m^3	15,210	2,737,800	Oil tank (4x3000m^3+3x2000m^3) manufacturing, installation, painting, insulation, thermal insulation, etc.
5	Contingencies			14,779,025*5%	738,951	The unit price is based on the total price of adding No.1 to No.4, and is multiply by 5%.
6	Total				15,517,976	

4. Costs of Transport, POD Port of Discharge and Short Freight (Unit: USD)

No.	Project Cost	Quantity	Unit Price	Total
1	Offshore costs		250,000	1,750,000
2	Floating crane lease	2	850,000	1,700,000
3	Large-sized crane making	2	357,000	714,000
4	Purchase of large-sized trailer	2	300,000	600,000
5	Purchase of various types of small trailers	6	100,000	600,000
6	POD Port of Discharge costs of various materials	1	150,000	150,000
7	Road and bridge Reinforcement	1	200,000	200,000
8	Contingencies	5,164,000*5%	258,200	258,200
Total				5,972,200

5. Summary Table (Unit: USD)

No	Project	Estimated Amount
1	Civil Engineering Cost	**19,008,354.00**
2	Equipment Acquisition Cost	**50,539,347.00**
3	Installation Cost	**15,517,976.00**
4	Costs of Transport, POD Port of Discharge and Short Freight	**5,972,200.00**
5	Total Cost	**91,038,377.00**

Contraction Service Fee for Technical Support On Power Generation, Maintenance and Training

Summary and analysis for annual management and training fee

Item	Contents	Amount (ten thousand USD)
1	Maintenance charge for Dili Power plant	25
2	Compensation and travel expense of management staff	130
3	Management charge for three power plants planning and collaboration	60
4	Training fee and compensation for local employee	30
5	Contractor management charge and profits	55
6	Total	300

The Second Section

Proposal for Timor-Leste State Near Term and Medium Term Power Systems (Nationwide Grid)

1. The Precondition Requirements and Present Conditions of Timor-Leste's National Power system Construction

1.1. Presently the total national installed capacity of Timor-Leste is about 44 MW, in which the installed capacity in Dili is 28MW, with a local 20kv power network, the installed capacity and power supply quantity is about 60% of the whole country's content. The actual power supply of Dili thermal power plant is only 16.75 MW, and it can not meet the need of power. Because of the serious shortage of power supply, the capital Dili has been often in a situation of limiting power, cutting the power and timing power supply. It's very popular that the government departments, enterprises, shops and resident families will prepare generators when they have the ability. Some provinces in the central and southern mountain areas generally only have the 1~1.5MW small type diesel oil power plant with separate 20kv local power network. Most of them are only for the night illumination, and there are many countryside villages haven't power to use at all. Serious power shortage has become the bottleneck for Timor-Leste to develop the economy, tourism, industry and to explore the mineral resources

1.2. The capital Dili is the center of the national politics, economy and culture. Presently more than 60% power load concentrates in Dili. Because of the frequent power cutting, not only the residents' life is influenced, but also, the quick development of industry, business and tourism have been restricted. And it's also related with the social stability. Therefore to fully assure the power supply to the capital is an emphasis consideration of Timor-Leste's national power construction.

1.3. According to the assumption of Timor-Leste government, the northern coastal area will be mainly used to develop tourism, and the southern coastal area will be the resources development and using area for petroleum, natural gas and mineral products etc. Maliana in the west area is the third biggest city in the country and is the main food crops area. Accelerating the southern power industry is very important to boost the economy development of the southern coastal area. At the same time to supply power as soon as possible to the residents living in the central mountain area is also the focus that the Timor-Leste government leaders are paying great attention to.

1.4. The serious incomplete of the basic information and data has made it rather hard to make out the Timor-Leste national power construction planning. Presently the required but lacking basic data and information in making Timor-Leste national power planning includes: transportation, weather, hydrology and geology.

2. Main Contents of the Near Term and Medium Term Timor-Leste National Power Network Construction Planning

2.1. Lay out the construction sites of power supply (thermal power plants) within the near and medium terms (1 year to 10 years).

2.2. Establish the frame of national power transmission network, establish the voltage grade of the national power network; this establishment should be lastingly stable and can be developed continuously.

2.3. Investment estimate.

3. Key Points for the Near and Medium Terms Timor-Leste National Power Network Construction Planning

3.1. Power Supply (Thermal power plant)

3.1.1. Layout of northern power supply points

Manatuto thermal power plant (120MW) and Dili thermal power plant (60MW) become the main-force power plants, and assume the task of supplying power to the northern area including the capital Dili and five provinces of Liquice, Ermera, Aileu, Manatuto, Baucau and Lautem.

Manatuto thermal power plant (120MW) as the main-force power plant mainly supplies power to Dili, the eastern industry city Baucau, and the northern provinces. It will be established and put into production before May 20, 2009.

The existing 28MW installed capacity of Dili thermal power plant will be mainly used as the security and standby power supply after the national united network is finished and begins to supply power. According the requirement of development, it's planned to be a 60MW peak load adjusting power plant in the medium planning.

3.1.2. Layout of northern (sic) power supply points

Initial plan is to select site in Same to construct thermal power plant, and it will be used as the main-force power plant, its first phase installed capacity is 60MW, and the final designed capacity is 120MW, and will bear the power supply to five southern provinces of Viqueque, Manufahi, Ainaro, Covolima and Bobonaro.

3.1.3. The authority and the contractor already have a plan to establish a 171MW heavy diesel oil power plant concentrated in Manatuto. In order to improve the level of national power network's safety and economic running. Now suggest splitting it into a 120MW northern main-force power plant and a 60 MW southern power plant.

3.1.4 Schedule of Power Supply Points Layout

Series Number	Construction Site	Near Term Installed capacity (MW)	Final Term Installed capacity (MW)	Remark
1	Dili	28 (existing)	60	1. The final capacity is the capacity that can be reached according to the demand of economy development within ten years. The construction of Manatuto power plant will be finished in 2 years, and will be put into production by 60MW every year. 2. Dili thermal power plant will be used as Dili's security power supply by using its existing 28MW installed capacity. 3. Same is the candidate site for southern thermal power plant. 4. Suai thermal power plant will be considered as the candidate site for the fourth thermal power plant according to its development demand.
2	Manatuto	120	120	
3	Same	60	120	
4	Suai		60	
Total		208	360	

3.2. National Power Transmission Network

3.2.1 Timor-Leste's power system consists of three parts: north trunk line, south trunk line and north-south connecting line (see graphics 1: Timor national high voltage power transmission networks geographic connection map)

3.2.1.1. North Power trunk line

The north power trunk line is mainly used to supply power to northern coastal cities to develop tourism industry. Manatuto thermal power plant's first phase 120MW installed capacity and Dili thermal power plant's existing 28MW will be the main-force power plant in northern power network. The north power trunk line supplies power separately to capital Dili and northern provinces like Baucau and Lospalos etc by the east-west direction.

In order to ensure the credible and safe power supply to the capital, double-circuit will be used from Manatuto to Dili.

The power transmission network will be 110kV voltage grade. There are totally five transformer stations of Dili, Baucau, Manatuto, Liquica on the north trunk line.

3.2.1.2. South Power Trunk Line

The south power trunk line mainly provides power to the southern area, it's planned to select site in southern Same to construct the thermal power plant. The installed capacity of the first phase is 60MW, and it will bear the power supply for Viqueque, Manufahi, Ainaro, Covolima and Bobonaro five provinces, at the same time provide power for Maliana.

The power transmission network will be 110kV voltage grade. The 110KV switch station will be set up at proper site (Burbururoron) on the south power transmission trunk line. There are totally four transformer stations i.e. Viqueque, Same, Maliana and Suai on the south trunk line.

3.2.1.3. South-north Connection Line

A 110kv connection power transmission line with the total length of 70km will be set up between Manatuto on the north trunk line and the 110kv switch station on the south trunk line, to form the H type power system network.

3.2.1.4. The power of the provincial capitals of three provinces will be supplied by the periphery Liquica, Dili and Same 110kV transformer stations by using 20kv voltage grade.

3.2.2. There are three grades i.e. 110kV, 20kV, 380/220V in the national power system, in which the 110kv is the high transmission voltage, the neutral point is the direct earthing system; the 20kv is the medium distribution voltage, the neutral point is small resistance earthing system; 380/220V is the low consumption voltage.

3.2.3. Schedule of the Power Transmission lines

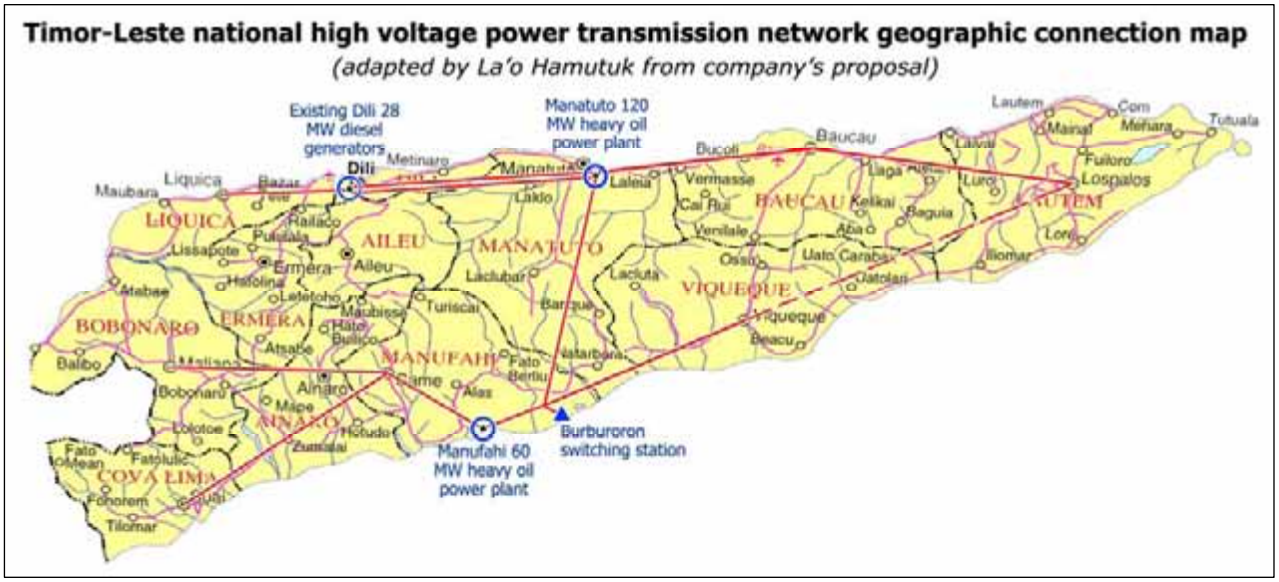
Series No.	Route of the Line	Circuit Number	Cable Sectional Area (mm^2)	Length of the Overhead Line) (km)	Remark
1	Manatuto—Dili	Double-circuit	240	2X60	North trunk line
2	Dili—Liquica	Single-circuit	150	30	North trunk line
3	Manatuto—Baucau	Single-circuit	240	60	North trunk line
4	Baucau—Lospalos	Single-circuit	150	85	North trunk line
Subtotal of north trunk line				295	
5	Viqueque-south pwr plant	Single-circuit	150	65	South trunk line
6	South pwr plant-Same	Single-circuit	240	45	South trunk line
7	Same—Suai	Single-circuit	150	80	South trunk line
8	Same—Malina	Single-circuit	150	60	South trunk line
Subtotal of south trunk line				250	
9	Manatuto—south switch station	Single-circuit	240	85	North-south connection line
Subtotal				85	
Total				630	This length of overhead line is estimated according to the UNFPA(2004) map.

3.2.4. Schedule of the 110kv transformer station and switch station

Series No.	Construction Site	110kv transformer station Near Term established power transforming capacity (MVA/set)	110kv transformer station Final power transforming capacity (MVA/set)	Switch station	Remark

1	Liquica	20/1	20/2		North trunk line
2	Dili	31.5/2	31.5/3		North trunk line
3	Manatuto	20/1	20/2		North trunk line
4	Baucau	31.5/1	31.5/2		North trunk line
5	Lospalos	10/1	10/2		North trunk line
6	Viqueque	10/1	10/2		South trunk line
7	Same	10/1	10/2		South trunk line
8	Maliana	10/1	10/2		South trunk line
9	Suai	20/1	20/2		South trunk line
10	Burbururoron			110KV	South trunk line
Total		163	447.5		

3.2.5. The 20kv trunk line with 110kv transformer stations supplying power to the peripheral provinces which haven't 110kv substation and its 20kv central switch station belong to the scope of national power network planning. Estimate by the map, The 20kv trunk line is about 120 km long, and it need three central switch stations.



3.3. Power Distribution and Consumption Parts

Timor-Leste's present 20kv distribution voltage grade will be Adapted as the distribution voltage, the neutral point is small resistance earthing. The consumption voltage grade is 380/220V. All the distribution and consumption equipment including 20kv distribution lines (except inter-provincial transmission lines) and all the 20kv transformers and 380/220V low voltage lines are not included in the design and construction scope of this project, and need to be designed and constructed in other projects.

3.4. Independent Power Network of 380/220V

The existing installed dynamotor capacity in special zone Oecusse is 0.5 MW; special zone Oecusse and island Atauro only need to properly increase generator sets and make necessary maintainance and improvement to the existing power system, then they will separately form good independent power network.

3.5. Brief Summary

1) The north power trunk line is mainly used to supply power to northern coastal cities to develop tourism industry.

2) The south power trunk line mainly supply power to the southern area, and it maybe at the same time supply to Maliana.

3) In order to distribute the load of north and south power trunk lines reasonably and improve the running reliability, set up the connection line to connect north and south power trunk lines, and different power plants can adjust the power from each other by the connection line.

4) In order to ensure the credible and safe power supply to the capital, double-circuit will be used from Manatuto to Dili. Meanwhile use the existing 28MW installed capacity of Dili thermal power plant as the security power supply for capital Dili.

5) High voltage power transmission network is 110kv and its neutral point is direct earthing system; medium voltage power transmission network is 20kv and its neutral point is small resistance earthing system.

4. Investment Estimate of National Power Network Construction.

4.. 110kv line

	Unit	Price(ten thousand RMB)	Quantity	Estimated Total Prices(ten thousand RMB)	Remark
Single-circuit line	km	200	570	114000	
Double-circuit line	km	250	60	15000	
Subtotal			630	129000	

4.2. 110kv transformer station and switch station

Construction site	Type	Unit	Quantity	Total Prices (ten thousand RMB)	Remark
Dili	transformer station	station	1	8500	
Baucau	transformer station	station	1	6500	
Liquica	transformer station	station	1	4500	
Manatuto	transformer station	station	1	4500	
Lospalos	transformer station	station	1	4500	
Burbururon	switch station	station	1	3500	
Viqueque	transformer station	station	1	4500	
Same	transformer station	station	1	4500	
Suai	transformer station	station	1	4500	
Maliana	transformer station	station	1	4500	
total	transformer station			5000	

4.3. Estimated investment of 120km inter-provincial 20kv power transmission trunk line and three 20kv central switch stations is 95,300,000 Yuan.

4.4. The total estimated investment for the national power network construction planning

No.	Item	investment Estimate (RMB)
1.	110kv line	**1,290,000,000**
2.	110kv transformer station and switch station	**500,000,000**
3.	120km inter-provincial 20kv power transmission trunk line and three 20kv central switch stations	**95,300,000**
4.	Total	**1,885,300,000**

5. Several Points of Explanation

5.1. Power system planning is the basic technology guide line to guide the power system construction; the finished power system planning will collectively have effect on the power system construction as

technology criteria, and will be restrictive and forcible to the future power system construction. Power system planning will do complete planning and design on the whole Timor-Leste state's power resources layout, power network towers and voltage grade. In the process of planning and design, there will be many aspects involved such as power energy resource data, power load requirement, power transmission line, power transformation, control communication, power load tide power and system stability etc. So the power system planning must be carried out by the special power design department or unit. Further more, a power system planning satisfying the demand and having high quality needs sufficient technological work time. At the same time, the process of power system planning and design needs the vigorous support and detail guide from the relative departments of the Timor-Leste government. Therefore, It's necessary at present to accelerate the implementation of power system planning and design.

5.2 In order to provide the first hand data to the power system planning and design, should faithfully carry out the works of selecting sites for the lines, transformer stations and south power plant and the works of engineering geological surveys.

5.3. The bad road and communication situation will possibly seriously influence the construction process of south power plant and power network.

5.4. This power system construction planning proposal mainly involves the thermal power plants and 110kv power network construction. As to the 20kv distribution networks of every province and city, should take good advantage of the existing distribution networks, under the principle of supplementing the lacking items to construct, so that to fully use resources and save investment.

Because the investment for the power construction is rather big, and the construction process needs a period of time, the power system construction should be carried out under unified leading, comprehensive planning and gradual implementation. The order of the power system construction and putting into use in different province should be according to the state's policy and development planning and adopt the principle of being developed with priority, considered emphatically and implemented in different sites.

5.6 The training of power plant and transformer station must be carried out in the construction period synchronously, to ensure the power system can be well constructed, maintained and operated.

6. Payment Method:

6.1. Consider that presently the RMB is continuously strong, US dollar continuously slumps, so this proposal uses RMB as the standard money to calculate price. The owner should pay any project payment by the exchange rate of US dollar to RMB of the day returning the loan.

6.2. The contractor should carry out detail construction survey immediately after the signing of the official contract of this project. The survey result should be reported to the owner and after the result being approved by the owner the contractor should begin the construction immediately. For this Stage, Owner is free of any charge.

6.3. The contractor hopes that the owner can pay 35% project payment during the project start and January, 2009. And pay other 35% in January, 2010. The remaining 30% should be paid in January, 2011.

6.4. Because the contractor constructs the project with using its own money, the contractor hopes that except the contract between two parties, the owner should provide certain effective financial guarantee to the contractor.

The experts group of Timor-Leste power system construction project

Group leader:_____

Vice group leader: _____

Technical Measures to improve Environment Quality of Heavy Fuel Generator Plant

1. East Timor is an island nation between Pacific Ocean and Indian Ocean, which is under the initiation stage of its development, it has low population density, and nice environment, it is rarely disturbed by industrial and factitious factors, and it has high-quality air, and strong environmental toleration, and the nation is basically in a state of nature. East Timor government has attached importance to environmental resource protection, and pay attention to environmental protection during the course of economic development, environmental protection measures must by implemented during the construction course of heavy fuel generator plant.

2. Major pollution generated by heavy fuel generator plant is waste gas pollution of exhaust smoke and release of waste water containing oil or oil leak pollution to the sea. During the construction course of the plant, relevant measures shall be implemented for projects that potentially generated pollution to the environment, so as to avoid or eliminate pollutions to environment generated by waste gas and waste materials during the course of power plant production. Contractors who construct the power plant shall attach importance to facilities work of environmental protection projects

3. In order to cope with the unexpected accident in case of fire on the oil depot, in line with the requirement of fire protection for fuel product, the foam fire extinguishing system shall be set up including but not limited to foam producer, foam fire pump and so forth. In case of fire warning in the oil depot, the fire extinguishing system shall be started immediately without any delay.

4. In order to prevent leaking oil from the oil reservoir due to the explosion of oil tank caused by any fire accident from flowing into the sea, the fire dike shall be established by adopting steel reinforcement steel and concrete structure for the oil reservoir. The protection scope of the fire dike in the oil reservoir shall be guaranteed in such extent that in case of the explosion of the largest oil tank full of oil unfortunately, the oil leakage will neither extend the scope of fire accident nor pollute the sea.

5. The drainage system of the plant shall set up the trash screen and water-and-oil separation pool. When the generator plant commences to run, the environment of the plant shall be maintained in clean manner, and the maintenance of machinery and equipments shall be strengthened so as to eliminate the pollution resulting from the oil leakage.

6. The primary fuel of the Generator Plant is CST180 heavy oil. The cost of this type of oil is lower than that of diesel oil, and therefore the cost of the Generator Plant is reduced greatly. However, compared with diesel oil, the heavy oil has higher specific gravity, more foreign substances, poor fluidity, and higher percentage of sulfur element and higher temperature of ignition. In terms of these problems, the Heavy Oil Generator Plant has adopted the perfect solutions with respect to the design of generator units, system design and equipment configuration of the plant and so forth.

   6.1. The waste heat boiler shall be provided for each unit. The steam produced by the water heat boiler shall heat the heavy oil up to 115°C~120°C so that the high adhesive heavy oil will flow through the pipes as freely as diesel oil at the normal temperature and thus will not result in the block influencing the work.

   6.2. The Generator Plant has set up the Heavy Oil Treatment Shop specially. Through high-speed centrifugal oil separator, the foreign substances and water shall be removed from the heavy oil so as to guarantee the normal atomizing of the oil and reduce the abrasion and weariness of the parts like nozzle of oil pump etc. caused by the foreign substances existing in the heavy oil.

   6.3. The running performance of the generator units is closely related to the degree of oil atomizing, and also depends mostly on whether high pressure oil pump nozzle and other parts can endure the abrasion, these parts are replaced timely during the operation and the angle and time of oil injection are well tuned. When the said work is well done, the heavy oil will have complete combustion, and meanwhile the oil consumption is low, the smoke color is good and the emission of black smoke is

reduced. Therefore, apart from the configuration of the machines, the quality of installation and rectification also play an important role. The emission of black smoke is caused by the insufficient and partial oil combustion, which is also the main cause of high oil consumption of generators. All in all, it is required to adopt the pump nozzle and other parts with good quality, high temperature proof, abrasion endurance, corrosion proof performance, implement the fine-tuning and rectification during the installation and operation and make repair or replacement with the spare parts in due course so as to reduce or avoid the emission of black smoke.

6.4. In order to improve the atomizing quality, the heavy oil shall achieve the complete combustion to the maximum extent. Therefore, the grinding treatment system for heavy oil shall be installed in the fuel combustion system. Through the heavy oil grinding machine imported from Germany, the particles of heavy oil can be decomposed into the fine diameters. Once this heavy oil is injected into the firebox, complete combustion shall be realized so that the quality of combustion is improved greatly. This system is seldom used for the heavy oil generator plants, but it has shown a good performance in the ocean-going vessels during using the bad quality oil the recent years. As for East Timor Heavy Oil Generator Plant Project, we shall invest extra hundreds of thousands of US dollars. By using this system, the oil will have more complete combustion and thus the quality of environmental protection shall be improved.

7. In terms of exhaust emission from the Heavy Oil Generator Plant, the sulfur dioxide is the main pollutant that has an adverse effect on the quality of atmosphere conditions. Therefore the reduction of content of sulfur element in the heavy oil will definitely decrease the emission of sulfur dioxide. The rate of high sulfur heavy oil with high sulfur content is sort of higher than that of the low-sulfur heavy oil, but it will cause more influence to the environment. Since the Plant is far away from the residence, and the environment has a higher acceptance capability, the local environment will not be affected obviously when the Generator Plant is put into production. Compared with that of ocean-going vessels using bad quality heavy oil with high sulfur content, its influence to the globe is extremely minor. The selection of appropriate heavy oil containing sulfur elements as per the requirement and possibility can lead to the balance of economic development and environmental protection and reduce the adverse effect.

8. The layout of the Generator Plant is well-planned with reason. The Plant is surrounded by many trees so that the noise influence to the office and living area is reduced, and the ambient environmental conditions are also beautified and purified. According to our design, most of the green belts are over 5 meters inside the Plant, while it is hard for the common generator plants to achieve the same. This is also a very significant measure for the environmental protection and beautification.

9. To sum up, we pledge to the highest standards implemented by People's Republic of China through a variety of measures, i.e. "Boiler air pollutant discharge standards" GB13271-2001 and "Air Pollutant Emission Standards for Thermal Power Plant" GB13223-2003:

9.1. Sulfur dioxide (SO_2) <900mg/Nm^3

9.2. Smoke Dust (dust) <150mg/ Nm^3

9.3. Nitrogen oxides (NO) <400mg/ Nm^3

9.4 Degrees of smoke blackness (Ringelmann blackness degrees) <1 degree

9.5 Chimney height> 20 m

9.6. Heavy oil content of displacement of <10 mg / L

9.7. Afforestation rate of the plant>35%

Procurement of heavy oil:

As for the procurement of heavy oil, the following channels are considered:

1. Singapore 2. Indonesia 3. Darwin, Australia