

## Eia case work development prospectus

### Power plant

#### Capacity requirements:

Current generating capacity in Bahara province consists of an oil fired power station in Bahara city, hydroelectric power plants at the Bahara dam and mini-hydro schemes on the Rivers Cee and Dee.

In 2000, the National Power Commission (NPC) issued its 10 year planning objectives in response to the 3<sup>rd</sup> NEDA Plan. For the Bahara province it was stated that, by 2020, generating capacity would have to be doubled from its 2000 figure of 1,075 MW. Of the 2000 total, 900 MW was generated by the relatively old and expensive Bahara oil-fired thermal station. While there is some further potential for expanding hydro-capacity in the region, and a no. of mini-hydro schemes have been proposed to support the electrification program, the NPC has decided that it is necessary to build a new 1700 MW station in the region. The main reasons are:

- 1) To satisfy a 10% per annum growth in the power requirement of the Province; and
- 2) The present Bahara city power plant, which currently supplies 900 MW, is now 15-20 years old and uses imported oil as its fuel source. It would need major overhaul by 2020.

It is proposed to bring in 4 x 275 MW sets by 2018 and 1 x 600 MW set by 2020.

#### Economic benefits:

As has already been stated, an increase in generating capacity is required to keep pace with the needs of general economic development. If capacity is not increased this could pose a severe constraint on industrial expansion.

Along with the general economic benefits of increased generation capacity, a major new power installation could also bring economic growth to the area in which it was located.

A power plant may act as a regional multiplier, attracting energy dependent industries such as paper/pulp, and possibly in the future bauxite smelting.

#### Fuel system alternatives:

3 fuel systems are available for the new thermal stations: imported fuel oil, indigenous coal and imported coal.

Imported fuel oil is considered the least satisfactory alternative, principally on account of cost and drain on foreign exchange. The preferred option is the use of indigenous coal of 2% by weight sulfur content, and which yields a 15% by weight ash content. Delivered cost would be of the order of P45-55 per ton. To the extent that the new plant might replace the present oil-fired Bahara city plant, this might represent a form of import substitution which is a general economic goal.

#### Siting Options:

2 possible siting options are given on the map.

Site A lies 5 km to the south of Baytown. Although there is no existing on-site infrastructure, the site is close to the railway and could be directly cooled. Site B, close to the existing power station site. This site is 7 km southeast of Bahara city on the south bank of the Cee Estuary. It could make use of some existing plant currently used for the Bahara city station, and would have access to imported coal/oil. However, it is not currently served by rail.

#### Summary of Major Environmental Impacts:

- 1) Atmospheric pollution arises from gaseous emissions from the burning of fossil fuels: in particular sulfur dioxide, particulates and nitrogen oxides. These can have direct effects on health including possible increases in incidence of respiratory diseases in exposed areas.
- 2) Certain waste products in particular fly ash, may be hazardous and should be disposed of in secure disposal sites
- 3) Surface water and effluent problems can constitute a serious environmental threat. Discharges of water with significant concentrations of salt and possibly sulfates can lead to pollution. Cooling water discharges will have an impact on the temperature of receiving waters with possible environmental effects.

### Irrigation

Within the past 10—15 yrs there has been considerable change within agriculture in Bahara. New disease-resistant crop strains and high yield varieties of staples such as rice and sorghum have been introduced, and pesticides and herbicides have been used. Despite the overall increase in production which has resulted, farmers on the plains are restricted to 1 rice crop per year due to the long dry season. Also the standard deviation away from mean rainfall is quite high and the uncertain timing and duration limits the use of certain HYVs in those parts of Bahara. The carrying capacity of the land for cattle is limited by the amount of fodder, notably clover, which can be produced.

The population of Bahara is increasing more rapidly than agricultural production under current levels of agricultural technology. A report in 2005 by the provincial department of agriculture argues that if current trends in agricultural production increases in demand for agricultural products continue, the current small regional food production surplus could be replaced by a deficit by the mid 2008s resulting in the need to import even some food staples.

Irrigation would allow rice crops to be grown in a year, and the more stable supply of irrigation water would allow hire using varieties to be grown. It may also be possible to grow certain cash crops such as cotton and citrus which would constitute a valuable regional export, possibly bringing in foreign exchange if overseas export markets could be found.

Rural depopulation is also a considerable problem in Bahara, putting pressures on the major urban areas, particularly the capital Bahara city. Irrigation may result in creating a stronger agrarian base, providing an increased demand for labor.

The aims of the introduction of irrigation are: 1) to increase agricultural yields by the introduction of double and in some cases triple cropping; 2) to reverse current trends in rural depopulation; 3) to increase the region's ability to meet the policy objective of agricultural self-sufficiency. These aims satisfy both central and regional economic development goals.

### Siting Options:

2 possible siting options are given on the map. Both sites are to the west of Baytown. Site A lies on the north bank of the River Bee. It would involve impoundment of the river to provide water in 2 or more canals and could cover an area of about 30,000 ha. Site B lies around the river Aye, close to a proposed cornfield development. Like site a, the most likely irrigation scheme would involve river impoundment and provision of water through irrigation canals. Larger discharges occur on the Aye than the Bee, and it is likely that an area of 45000 ha could be supplied with irrigation water.

### Summary of Major Environmental impacts:

- 1) Land use change may result in the need to resettle oustees. In the case of these schemes, about 1000 would need resettling at site b, and 700 at site a.
- 2) An influx of population may occur resulting in several potential environmental problems, such as sewage, which could be a severe problem if not treated properly.
- 3) A variety of hydrological impacts may occur, including siltation, erosion, salinization and possible waterlogging. The quantity and quality of irrigation water must both be considered.
- 4) Ecological impacts would occur both within and outside the area irrigated. This could be a serious problem in site a.
- 5) Possible health effects might also be severe as waterborne diseases spread as a result of irrigation schemes.

### Coal Mine

#### Fossil fuel requirements:

A 2000 report by the provincial energy dept which assumed medium rates of economic growth and constant real costs of imported fossil fuels, projected that by the late 2005, there would be a demand in Bahara for an annual supply of fossil fuel of 10 million tons coal equivalent. At present the fossil fuel needs of Bahara are provided largely by imports of coal from neighboring regions and more especially oil from abroad. The coal deposits to the north of Bahara represent a major resource undeveloped. Seams are nearly horizontal and are exposed at the surface in both sites, making opencast mining feasible. Fossil fuel will be increasingly needed within the region as industrial developments will require a large increase in supply of fossil fuels. In particular the proposed 1700 MW power plant would consume over 4 Million tons of coal per year when it becomes operational. Indigenous coal could also be of use in other industries in the region, perhaps making tin smelting around rivertown more profitable. The proposed petrochemical plant would also require coal both to fire boilers, and to provide feedstocks for manufacturing plastic. With the high price of oil, which needs to be imported, the possibility of a cheap source of coal could be a major advantage for the development of a chemical plant.

#### Economic benefits:

As potential mining operations would be opencast, and coal deposits seem expensive, it is likely that Coal could be produced relatively cheaply. Coal could also be used in place of oil for a number of industrial needs, including the proposed power plant. This would result in a saving a foreign exchange and could allow further import substitution, which is an important national goal. It is also possible that coal from Bahara could be exported to other regions of Narnia; it might for example be able to compete economically with alternative fuel supplies to the steelworks in Crandera, a province to the north. However, in national terms it is not clear whether development of a cheap coal supply in Bahara would have a negative effect on energy supplies elsewhere in the country. It is likely that a coal mine would act as a significant regional multiplier, attracting large amounts of labor in the initial construction phase and increasing the demand for consumer good and services by mine workers and their families. If site b were chosen, the associated development would perhaps open up a region which is to date undeveloped. This might have both positive and negative repercussions for the local economy and environment.

### Siting Options:

In both sites the coal lies in near horizontal seams and would be amenable to opencast mining techniques. However, the relief is more complex in site b which might make engineering problems greater than at site a. Site a lies 20 km to the west of baytown. Although it is considerably closer to baytown than site b, and the post mining land reclamation for agriculture would be such a significant problem, a certain amount of resettlement would be required for Austin farmers. Also the infrastructure development which might be after she been with the mine might conflict with the development of irrigation. Site b lies 70 km west of baytown and to the south of the river Aye. This is currently a fairly remote area; although the aye is suitable for navigation by small boats, it would require some straightening near the aye – bee confluence to make it navigable by coal barges. There are also major problems associated with land reclamation too far is if the coal resources were developed.

### Summary of Major Environmental Impacts:

- 1) Land use changes. A serious environmental problem could result from the extensive land use change over an area of several thousand hectares associated with mining development. Resettlement problems and land reclamation would be the two major associated affects.
- 2) Land reclamation. Large volumes of overburden/ spoil are produced in open cast mining, and storage before reclamation must be carefully monitored. For storage can contribute to dust and water pollution, especially sediments in surface run off. Storage and management should take account of eventual land reclamation objectives as well as intermediate revegetation program.
- 3) Atmospheric emissions. Mining operations produce gaseous emissions and dust particles. Bees can constitute both a nuisance and potential environmental problems depending on the location and local environment.
- 4) Water. Mine drainage and run off can cause pollution depending on the characteristics of the overburden and the method of storage. Mine drainage can often be acidic.

### Petrochemical Complex

The expansion of industry is a major goal in Narnia's development strategy. In the third Five-year plan investment in industry was made a high priority and 25% of the budget was set aside for it. Within Bahara province, the goal of industrial development has been recognized and a report from the Chamber of Commerce in 2000 has stated the following objectives:

- To bring in foreign exchanges through export to overseas market.
- Import substitution, which is an important aim in that costs of imports of manufactured goods have risen rapidly in recent years.
- To make use of the country's resources. A major aim is to process home-produced raw materials, rather than exporting them as at present. There is also a large supply of cheap labor and
- To supply other provinces of Narnia with manufactured products.

There are several raw material sources within Bahara, including coal, tin, limestone, potash and bauxite. There is no oil or natural gas within the region.

### Economic Benefits:

Although no natural gas or oil are found within Bahara, at present the outputs of such industry, including plastics, synthetic rubber, synthetic fibers and organic petrochemicals, must be imported. These products provide the basis for the manufacture of many consumer goods, which are in increasing demand as living standards are rising. They also act as valuable inputs to other industries such as adhesives, pharmaceuticals, detergents, solvents, plastics and synthetic fibers.

It is hoped that setting up a major petrochemical complex in Bahara would bring economic growth to the region in which it is located. It would act as a regional multiplier attracting numerous subsidiary and allied industries. Construction of the plant and its subsequent operation would provide a considerable amount of employment, even though the petrochemicals industry is relatively capital intensive.

Siting options:

2 possible sites are identified. Site a lies on the coast 4 km to the southeast of Deepport. It would have access to the port facilities of Deepport, and to the railway. This would be the first major heavy industry to develop in Deepport, which has at present mainly light manufacturing industry. Site b is within the industrial estate 15 km west of Bahara city, where there are already a number of allied industries.

Major Potential Environmental impacts:

- 1) Atmospheric emissions of sulfur oxides, NO<sub>x</sub>, CO, HC, particulate can cause respiratory problems in exposed populations and also affect neighboring agricultural and natural ecosystems.
- 2) Wastewater contaminated chemically or altered thermally, which can result in death of fish and health effects on drinking water if controls are not enforced.
- 3) Solid waste maybe hazardous or toxic and must be disposed of in secure landfill sites, line to prevent seepage.

Attachment A. 2 – The central government has provided you with various documents and reports that indicate the international and national concern for environment and development issues.

World Commission on Environment and Development: Overview

There has been a growing realization in national governments and multilateral institutions that it is impossible to separate economic development issues from environmental issues; many forms of development erode the environmental resources upon which they must be based, and environmental degradation can undermine economic development. Poverty is a major cause an effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequity.

Government of Narnia: Environmental Protection Act – General powers of the central government 2001.

Subject to the provisions of this act, the central government of Narnia shall have the power to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of environment in preventing, controlling and abating environmental pollution.

The state of Narnia's environment: a citizen's report, 1998.

It is false to argue that environmental conservation acts as a on economic development. On the contrary, the experience gained in the last three decades has convincingly shown that there can be no rational and equitable economic development without conservation. Environmental degradation invariably results in increased economic inequalities in which the poor suffer the most. Environmental degradation and economic stagnation are 2 sides of the same coin. The human condition and the state of the environment are closely related to each other.

The fifth World conservation Lecture, 2000

There are today hundreds of voluntary groups in the country involved in environmental issues, and their experiences and interests are extremely diverse. Some are interested in preventing deforestation, while others are only interested in afforestation. There are many which want to prevent the construction of 1 dam or another; there are others who want to prevent water pollution. There is the famous fishko Movement in the mountain province, probably the oldest and most famous of all the groups, which has played a major role in bringing the issue of deforestation to the for a of public opinion. Dams have already been stopped because of strong people's protests. Grassroot groups have campaigned against water pollution by industry and faulty irrigation systems.