

## INGSA CASE STUDIES

### *ALTERRA: AIR QUALITY AND ENERGY*

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# ALTERRA

## AIR QUALITY AND ENERGY

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### Background and context

Alterra is a low-income, predominantly rural country (75% of population lives outside urban centres) but with a fast-growing economy, with an average increase of GDP of 6% annually. Long-term immunization campaigns and efforts to improve sanitation and good provision with drinking water have resulted in a big reduction in infectious disease rates. Infant mortality has dropped from 150 to 40 per 1000 live births over the last 15 years and maternal mortality is showing a similar trend. Poverty among the growing population is reducing, although a third of the country's population of 6 million still lives under the poverty line. The government is investing into education, with literacy rates rapidly improving (especially among girls). "We will go straight into post-industrial era" says the ambitious government, but at the same time only 50% of households are connected to the electrical network and power cuts are an everyday occurrence for those citizens who have connections to the grid.

The geography of the land-locked Alterra is a mix of hills and valleys. The prevailing wind patterns provide little breeze in the valleys where the major towns are located. Trucking using diesel fuel is the main form of transport and electricity is generated largely from coal extracted from deposits in the north-east of the country. The most significant health polluters are emissions produced by burning wood and charcoal, used for cooking and heating because of lack of other options.

These factors plus the growing population, more roads to rural areas allowing for better trucking services, improved economic standards and industrialization have resulted in a dramatic deterioration of air quality, leading to a new set of health challenges. In cities, the new middle classes are now driving cars, yet most are second-hand imports from Asia with poor emission profiles. Air pollutants are involved in acute lower respiratory infections (bronchitis, pneumonia), chronic obstructive pulmonary disease and cancer. In particular the rates of lung cancer have skyrocketed, although this may be partly due to an increase in tobacco smoking as international tobacco companies have realised that marketing in poor countries helps replace their declining consumption in western countries.

Public health authorities are warning that the provision of clean energy is now not only an economic but also a public health problem. "We haven't reduced the rates of infections only to see our people die a slow death from lung diseases" says the local oncologist, working with the WHO. A recent report in Nature (12 July 2018) suggests that > 20% of infant deaths in the region are a result of air pollution. In Alterran newspapers, the issues of human health, environmental pollutants, energy accessibility and economic growth have become entangled.

## Problem

The government of Alterra is aware that the current energy situation is now impinging both on economic growth and human health. There is an urgent need to scale up the energy production rapidly yet with many demands on its limited budget, the solution must be cheap.

The fastest and cheapest option is to upgrade the existing thermal power stations using coal and peat. Alterra has considerable deposits of both peat and coal especially in the northeast of the country. Ministers of Regional Development and of Energy, regional leaders as well as experts in the energy sector see the upgrade of thermal power stations as preferable solution. They are aware that coal and peat-based power plants are emission-producers, yet in contrast to the current state where air pollution is uncontrolled and produced by many small emitters, they contest that their emissions can be controlled and are localized. With regard to Alterra's country emission profile and impact, they argue that the country (which contributes very little to the global emissions) should not worry too much and that it should leave the leadership in green technologies to wealthy countries that are also the biggest emission producers.

Not everyone agrees with this solution. A group of opponents, led by the Minister of Economy, Business and Innovation and supported by the growing environmental movement, point out that this is not a cheaper solution as the exact amount of peat and coal deposits are not known and the country may end up having to import resources for ultimately obsolete technology. They argue that the country would be better off focusing on solar and wind power, which could help position itself as a new regional leader in energy innovation. This is not an entirely new proposal: in rural areas off-grid, solar-panel power supply is common, but the problem of storage remains. An Asian company, ElectroFutures, has just come out on the market with a battery that promises to exceed all the existing solar energy storage solution. It is offering to sell the technology to Alterra at cost in exchange for using the country as the case-study and advertisement. While the ElectroFutures proposal has its enthusiastic supporters, the technology is entirely untested.

The Minister of Foreign Affairs is worried about the continued increase in influence of companies from Hira (the country where the ElectroFutures has its headquarters). Hira has been investing heavily in key infrastructure in Alterra for a decade and now has a network of supporters and business partners throughout the country.

Finally, the country has the potential for substantial hydropower and there are many who argue that the best solution would be investing in a major hydropower station; some of the advocates include proponents of thermal power stations, who see the upgrade of thermal power stations as the short-term solution with the investment into hydropower as a long-term goal. The largest river of Alterra, Dayao, is demarcating the border of Alterra and its neighbour Hainish, a much larger country yet with a lagging economy and ongoing ethnic conflict. Any projects would have to be conducted in partnership with Hainish. Proponents argue that a cross-border project would be welcomed by Hainish (as they have the same problem as Alterra, only on a larger scale, and need to upgrade their energy supply) and that it would split the cost. A major foreign country with interests in the region and which has taken sides in the Hainish conflict has indicated that it would offer technical and fiscal support for the dam. Critics are pointing out that the Hainish government is not stable and any agreements may not be respected in future. It is not clear how any investments would be safeguarded, should Hainish decide to withdraw from agreement.

There is also a worry that the damming of the Dayao River will have significant environmental effect and negatively impact the agriculture in the river plain (the area with the highest population density in Alterra). Local environmental activists, supported by a major international environmental charity, have also argued that damming the Dayao would harm the habitat of several wading birds and rare amphibian species. The high-end ecotourism focused on bird watching in the wetlands of the Dayao is slow- growing but its potential is strong.

**The prime minister is asking her science advisory board to advise her on how to proceed.**

## Notes for the mentors

### Stakeholders from whose perspective the problem should/may be considered:

1. Government of Alterra as a whole/PM
2. Individual Ministers (Energy; Foreign Affairs)
3. Energy sector
4. Environmental movement
5. Tourism agency
6. Foreign investors (ElectroFutures) and their Alterran business partners
7. Regional authorities, e.g. in the northeast, in the river plains, and the mayor of the capital (largest and most polluted city)

### Considerations:

1. Disentangling the issue of air quality and the impact of environmental pollutants on human health from the problem of energy. Is there evidence for measures that can be done to improve the air quality in particular with regard to the reduction of pollutants that are the most harmful to human health, separately from investments into energy?
2. While the best solution for human health is one that does not pollute the air, 'clean' solutions that are not stable or too expensive may lead to the rejection of technology and sticking to old, highly polluting an inefficient one(s).
3. For energy, separating the elements of decision-making not based on scientific evidence (e.g. international relations—with Asia, or with the neighbours; financial cost of building) from those based on science; and then, secondly, different kinds of scientific evidence (impact on environment, human health) of different modes of energy production.



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