

# Energy Crisis in Nepal

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## Disharmony

Spontaneous development is a process of co-operative endeavour between the private and public sectors. *Quid pro quo* between the two sectors however requires a melioration in the nature of 'trade-off' that exists between them, especially in the context of developing countries.

Lop-sided preference reveals that the public sectoral enterprises are the major beneficiary of the system in a developing economy like ours. Preference of sectoral selection, resource availability, foreign exchange facilities, tax subsidies, easy access into the administrative bureaucracy are some of the quantifiable advantages over the private sectoral enterprises.

In spite of all these incentives the public enterprises are still not putting up a good performances. The speculation and ambiguity is as to what measures should be taken at this stage to enhance their productivity and performance in the long run. Could it be that this sector is over protected and therefore the scale of decentralisation is refrained? Or is it that this sector suffers from more absentism and lacks more competitiveness?

## Paucity of 'Initiation' and 'Confidence'

Looking at the performance of public institutions, affiliated with 'Energy-Preservation and Production', what one apparently tends to see is an ostentatious institution, resourceful and furnished with sophisticated laboratory, expertises and other pre-requisites, and sporadic research papers on some remote topics on energy. These institutions are undoubtedly well-manned ( which are endowed with both local and imported expertises ) compared to any similar private sectoral enterprises (for whom it is beyond their means) but that they mostly seemed to lack was 'initiation' and 'confidence' to implement the plans and programmes that they have formulated through their own descretion.

## Energy Crisis

The lofty mountains and magnificent Himalayas that have added prominence to the landscape of Nepal impersonates as a malignant economic curse. Out of country's total

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land area of 147,181 sq. km., only 16 percent has been found cultivated. Forest resources have always occupied an integral position in the national economy of Nepal. The country's extensive and varied forest resources accounts for almost one third of the total area which is estimated to be about 4.5 million ha.

The hill forests have virtually been stripped off because of heavy settlement and over-exploitation of fuel wood and animal fodders. It is estimated that the average consumption of fuel-wood in Nepal is around 13,200 tons diurnal consumption in the hill regions alone. This would be around Rs. 3,96,000/- day in economic term. This not only creates denudation leading to soil erosion, but also has affected the livestock production in these regions. As fuel becomes scarcer it takes more hours/day to collect household supplies and areas of the forest never before exploited 'are now subject to the wood-cutters axe'.

A study by the Nepal Energy Research and Development Group (NERDG) reported that commercial energy in Kathmandu Valley covered about 63.3 percent. Out of the total non-commercial energy consumption, fuel-wood alone comprised 97.2 percent and the rest constituted vegetable waste, husk and cowdung. The wood fuel consumption which was 96 million gigajoule ( which is approximately equal to 280 Kwh or 34Kg of coal ) in 1976 is expected to be 107 million GJ by 1985 and 113 million GJ by 1990 for Nepal.

It is estimated that firewood consumption is about 2kg/cap/day or about three quarter of a ton/person/year. So the fire-wood requirement for a city like Kathmandu would require procurement of about 94 ton/day and around 30,695.5 tons of fuel wood annually. It is estimated that the sustained yield / ha is around 2.5 tons / year, therefore it would require at least 12,786 ha. of land to replenish the firewood demand for Kathmandu alone.

### **Strategy and Surrogate**

The fuel consumption trend in most of the developing countries are homogenous in nature, perhaps as much as 920 millions cubic meters of wood, 400 tons of animal waste and about the same amount of crop residues are burned in developing countries every year. This is equivalent to almost 5 million barrels of oil/day and represents roughly one quarter of the energy used in developing countries. It is estimated that animal dung burnt today is more than the total fertiliser consumed in agricultural production in Nepal. If this animal dung is used as fertilizer the food production could be augmented substantially.

Two pronged strategies can be proposed to substantially expedite the energy crisis:

#### **Short-Term Strategy**

This would be more permanent in nature and would exert more extensive impact upon that segment of the community using traditional forms of energy for domestic consumption. This segment comprises of about 80 percent of the total populace and would therefore envisage a broader coverage.

### *Usage of 'briquette fuel'*

This refers to the technology of partial pyrolysis or carbonisation of any type of bio-mass under controlled conditions. During this process, liquid, gaseous and solid (char) products are produced. The char product is mixed with nominal percentage of clay, starch, molasses and extruded into cubical forms usually named as 'Briquette'. Briquette weighs about 50gms and has a heating value of 4000 to 4200 K. Cal/Kg compared to the heating value of coal of the order of 4000 to 5000 K. Cal/Kg. The 'briquette' being compressed from bio-mass contains more extensive heat, i.e., its burn time compared to hard wood, soft wood and petroleum wax log is far higher. If hard wood's burn time is 2 to 3 hours and soft wood's 1.5 hours and petroleum wax log 2 to 3 hours then 'briquette' burn time is 3.5 to 4 hours.

### *Gasifier Project*

The gases that produced (methane and hydrogen mono-oxide with 950-1200 K. Cal/m<sup>3</sup>) being combustible are recycled and burnt to give the heat of Pyrolysis. These gases can be used most conveniently as a substitute fuel for internal combustion engines used for DG-set applications, agricultural water pumping, powering of threshers, cutters, generating electricity. With approximately about 2 tons of rice husk as much as 25kw of electricity power can be generated.

The major advantages of both these units are usage of multiplicity of both agro-based and forest wastes as potential raw materials such as (paddy straw, sugarcane pilt, coir pilt, bark rice-husk, pine needles, groundnut, peanut and corn shells).

'Briquette' can be used more efficiently as a substitute to firewood, charcoal, coal, kerosene and gases. It can be used for domestic consumption, furnaces, brick industries, ovens, etc. The overall thermal efficiency of this fuel is about 3 times that of direct burning of wood or bio-mass.

### **Long-Term Strategy**

This refers to mostly melioration in the managerial/organisational pattern.

### *Management of 'Fresh Plantations'*

Replantation should not be taken as an end in itself, it is just a means. Replantation being left as it is (at the moment) is not going to replenish any tangible substitute to the existing 'fuel crisis'. There is no follow-up of these 'plantations' at a national scale. It is completely left at the mercy and benignity of nature. It lacks people's participation at a larger scale in the one hand and inherent management system to provide 'constant surveillance' over these spheres on the other. It has become a political slogan to undertake 'Replantation Schemes', but it does not have dedicated 'political will' to nurture and tend this theme in a more systematic and organised way.

### *Complete Cessation of Timber Export*

Timber being indispensable within the country should strictly be restricted for any form of exportation (as is being done at the moment).

### *Introduction of Forest Mining Project*

This necessitates for conducting an updated research on the actual fuel-wood demand pattern in the nation. This not only furnishes adequate informations to undertake scientific forest mining projects in different pockets of the country but also at the same time extracts people's participation by delegating them with more responsibilities and decentralising authority to nurture and tend the forest for which direct incentive can be granted by allocating greater degree of financial assistance (grants to the Village Panchayat whose credibility shall be measured/weighed in accordance to the nature of the development of these forest mining projects.

### *Quid Pro Quo*

Private sector which is always blamed to be shy should be given more incentive than at the moment and an amiable atmosphere of 'trust' and 'confidence' should be developed in the economy to allure and inspire them. It is an irony that inspite of resource constraint and limitations of curricular privilages/advantages they entertain) compared to the public enterprises), positive alternative has been provided by the private sector (Nepal Bio-Extruder Group) to solve the energy crisis, which has taken them three years of extensive research and patience. Briquette industry has been initiated in Nepal for the first time to replenish a substitute to the fuel energy. This is the first of its kind in Nepal and first of its size (using rice husk) in the world.

Project of this nature, which has proved to be a success for Nepal, deserves more co-operation from the concerned public institutions. The product of this nature could be upgraded if an access is given by these institutions to use their sophisticated laboratories and other facilities.

'Briquette' will in the near future revolutionise the 'energy sector' in Nepal because the project of this nature not only is indigenus in nature (both pre-fabrication and assembly aspect) but even the raw material is locally available in abundance. Such innovatory project deserves priority/promotion and therefore deserves broader speculation if 'energy crisis' is to be dealt with more pragmatically.

### *Innovation and even Rennovation of the 'Traditional Ovens' (Chulas)*

Effort is being made to disseminate the concept of 'effecient *chulas*', but the 'demonstrtion effect' of these 'effecient *chulas*' has not yet become positive. One has to speculate both 'Supply and Demand' aspects of the product being introduced, before the product is ready for marketing. The basic concept of 'effecient *chulas*' has both demand and supply lags. There is no specific institution as such that has the potentiality to commercially furnish the demand and on the other hand, no specific and pragmatic study has ever been conducted (at a national/commercial scale) regarding the receptivity of these *chulas*. It is just not effective to confine these ideas within the confines of few public institutions which have after a big lapse of

'trial and error' been succesful in presenting these goods merely for 'window shopping'.

The best alternative here is again the usage of 'briquetted fuel' which can be most efficiently used in any conventional oven just by inserting a grit or a net (which can be done by any layman and does not at all raquire any degree of proficiency) just for the briquettes to settle down.

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