CHAPTER VI

SUMMARY AND CONCLUSION

Man's activities both directly and indirectly depend on energy. Energy is the lifeblood of development. However, many underdeveloped countries experience the shortage of energy. Energy resources have become very crucial in the context of India's efforts for development in different sectors of economy. Due to the skyrocketing the oil price in the international market has increased and there is a heavy burden on the already overburdened foreign exchange. India's problem of energy crisis has worsened. To overcome the energy crisis the development of Bio-gas was suggested.

Indian villages need cheap, reliable and assured energy sources for different purposes like ploughing, water lifting, lighting, cooking, oil pressing, transport, small industrial units etc. However, the installation of Bio-gas plant to extract the gas is within the limit of the individual rural
families. Further, the gobar required as raw material for Bio-gas production has no dearth as the cattle population available in the country is estimated to be about 37 crores in 1986.

In drought prone areas like Anantapur, development of Bio-gas is an important remedial measure to meet the energy crisis. There are about eleven hundred Bio-gas plants in the district. Of them, 770 belong to the KVIC model and the rest Janata model. For, the size of the plant varies from 3 cm to 10 cm. In this context it is very appropriate to conduct a study to assess the acceptance or otherwise of the Bio-gas plants suitability and susceptibility to repairs etc. To understand the problems and prospects of Bio-gas plants in Anantapur district the present study has been conducted. The main objectives of the study are:

1. to examine the importance of different kinds of energy sources in the context of rural development in India;
2. to study the nature of energy problem in drought-prone Anantapur district with special reference to Bio-gas;
3. to examine the socio-economic characteristics of sample villages and households;

4. to assess the relevance of Bio-gas plants through empirical analysis; and

5. to suggest ways and means of saving energy in the rural areas with a special emphasis on Bio-gas plants.

The study is confined to Anantapur district. For the study a sample of 100 Bio-gas plants were selected based on proportional random sampling.

DIFFERENT SOURCES OF ENERGY AND THEIR IMPORTANCE:

Energy is the capacity for doing work. The sources of energy primarily includes, human, animal, winds, solar, tidal, and hydropower. Human beings are consumers as well as producers of energy. It is human mind and physical strength which utilise the energy resources for the well being of the society. Man continues to depend on his energy producing capacity in his day to day life.
In underdeveloped agriculture, human and animal energy are the basic sources of production. But depending on these sources it would not help modernisation and development.

Hydro power production is undependable in countries like India where water supply and flow depends on levels of rainfall which is mostly precarious.

The development of tidal and wind energy remained to a limited area. Solar energy has not been fully successful in this country.

**IMPORTANCE OF BIO-GAS ENERGY IN THE CONTEXT OF RURAL DEVELOPMENT:**

Energy is the life blood of economic development and energy as such has no substitutes, though there are alternative sources of energy. Energy becomes a crucial input in achieving growth in different sectors of economy. The energy requirements for different people vary, but yet energy in some or other is needed by all. Energy resources become limited as tempo of development gains momentum.
India is a country where developmental levels are diverse, as such energy from cowdung and fire-wood is as relevant, as the ore from atomic fission. Indian villages need cheap, reliable and assured energy sources for different purposes like ploughing, water lifting, lighting, cooking, oil pressing, transport, small industrial units etc. Bio-gas production at household and community levels would help in solving the energy problems faced by rural people.

There is a general feeling that Bio-gas energy locally produced must be acceptable than electricity transmitted over long distances from centralised generating stations.

The use of Bio-gas technology helps to produce more energy compared to the direct burning of cowdung. A good quality manure is available from the Bio-gas plants. When the gas is used as fuel, there is no problem of smoke. Again Bio-gas energy is cheaper than diesel, electricity and kerosine. It helps to reduce indiscriminate felling of trees for fuel and consequent deforestation and environmental problems.
Bio-gas production helps in solving rural sanitation problem. This energy producing units can be established in remote villages in thousands. Above all, the technology involved is simple and it can be made easily acceptable and adoptable by all sections of the rural society.

The history of Bio-gas plants in India can be traced to the fourth decade of present country. But even after a long period of energy planning and propagation through KVIC, the spread of Bio-gas plants has not been satisfactory.

In Anantapur district the forest coverage is scarce. Periodical and severe drought in this area do not help the tree growth. Consequently, there is an imperative need to develop alternative energy. The development of Bio-gas is an alternative answer for this energy crisis.

SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLED VILLAGES AND HOUSE HOLDS:

The sample beneficiaries are spread over 24 villages. The sample represented both big and small villages. The male population was numerically
more as compared to female population. Schedule caste population was there in all the sample villages and the schedule tribe population was confined to fourteen villages. The rainfall records show that, none of our sample villages are receiving sufficient rainfall for substantial growth of forest. However, considerable amount of area was reported under culturable waste and area not for cultivation. There is no land earmarked for raising orchards, which would be of considerable help in solving the firewood problem. Irrigation facilities are meagre.

All but one of sample beneficiaries belong to Hindu religion. Of the total 100 samples 44 belong to Kapu caste, 21 to Kamma caste followed by 9 to Brahmin, 7 to Balijas and the rest 19 to other small caste groups. However, the representation is poor among schedule castes and tribes.

The sample beneficiaries are fairly distributed in different age groups. Most of the beneficiary households are headed by males (97 per cent). All the heads of the sample beneficiary households are married. The education levels has played a significant role in
promoting and establishing bio-gas plants.

It can be concluded that joint and large families have preferred to establish bio-gas plants.

Agriculture is the main occupation for 65 per cent of the respondents. As many as 65 per cent of the respondents are having secondary occupation.

It is clear from the study that, size of the holdings played an important role in establishing bio-gas plants. Landless people have not gone for the establishment of bio-gas plants. The beneficiaries with small size of holdings have gone for small size of bio-gas plants. Only higher income groups in rural areas have gone for the establishment of bio-gas plants. The number of livestock per bio-gas plant works out to be 14.89 in our sample.

WORKING OF BIO-GAS PLANTS - AN EMPIRICAL STUDY:

Of the 100 sample plants, only 66 are in working condition. The rate of failure of bio-gas plants on the whole is considered to be 34.0 per cent. If un-commissioned and incomplete plants are excluded the 'rate of failure' comes to 25.8 per cent. The
'rate of failure' is more in Janata type as compared to KVIC type.

On an average, Janata plants worked for a period of 3 years and five months and were shut down for a period of 2 years 9 months. When the period of working is considered, the 'rate of failure' is 44.9 per cent in the Janata type and 33.7 per cent in KVIC type.

The KVIC type of plants were given prominence in recent years. However, as many as 14 per cent of the plants of KVIC type are experiencing initial starting problems as compared to 8.0 per cent in Janata type.

It is found that considerable changes has not taken place in the numerical strength of livestock. However, the per plant 'standard cattle' are less for incomplete plants as compared to either working or non-working or uncommissioned plants.

Subsidy facilities have been sometimes misutilised. The incomplete plants of KVIC type received higher amount of subsidy as compared to others. Subsidy has been fully paid even to the
uncommissioned and incomplete plants.

Among the beneficiaries having KVIC type, 55.8 per cent expressed adequacy of gas compared to 41.3 per cent having Janata type.

About 44.2 per cent of the respondents having KVIC type and 58.7 per cent in case of owners of Janata type have confirmed about their usage of additional fuel for cooking.

A higher percentage of plants are being attended by household personnel in feeding, watering and slurry removing in case of working plants. But in the case of non-working plants, personnel involved in operation were mostly permanent labourers.

Only 33.2 per cent of the repairs are carried out by NEDCAP as compared to the rest 66.8 per cent of repairs done by private people.

Again NEDCAP's role was limited only in case of defect in stove burners. The average amount spent per repair was more for non-working plants as compared to working plants.
Majority of beneficiaries experienced the fall of bio-gas supply during winter as compared to summer, due to the cool climatic conditions.

The reasons reported for the non-completion of bio-gas plants was incomplete civil construction, and failure of the part of responsible agency to supply domes and pipes.

Of the six uncommissioned plants, four are facing the lack of during as the reason for non-commissioning of plants and the rest have changed the house location.

Findings noted above may help to suggest certain measures so as to make the bio-gas spread programme a success. The suggestions may have wide range of applicability and need not be confined to the geographical area to which the study is actually confined.

PROPAGANDA:

For the spread of bio-gas technology, the propaganda should be on the lines of a calm revolution. All the available media facilities should be explored for the spread of the message. The message
should reach the small and marginal families, the handless labourers, the artisans, who had hitherto neglected the sect in the spread of bio gas technology. The nuclear families of the better land owning households need to be encouraged.

The propaganda should aim at the assimilation of knowledge about the advantages of bio-gas in connection with cost of the plants and benefits. The people have to be educated about the loss of burning of dung when compared to the production and manure quality. The advantages of smokeless cooking and rural sanitation need to be stressed. The disadvantages of indiscriminate tree felling and deforestation has to be emphasized.

SPREAD OF BIO-GAS PLANTS :

The installation of bio-gas plants has to be spread to remote taluks and villages. Just installation of plants on the road side village is not going to solve the issues. As such taluk and village-wise planned installation of bio-gas plants has to be taken up. Hitherto neglected taluks and villages should be emphasized in future installation of bio-gas plants. Any lacunae in this regard on
the part of responsible personnel should be viewed seriously.

INPUTS:

The bio-gas plant inputs need not be confined to cowdung alone. The people have to educated above the advantages of using bio-urine human waste and Agricultural waste as inputs for the gas production. However, it may not be easy to prepare the people for this as uneducated, religious and custom minded people may hardly accept to cook food on the gas supplied by the plant which uses human waste as inputs.

For the successful working of the plant, continuous supply of dung is necessary. The supply of dung depends not only on the cattle strength and also the fodder or feed they receive. The cattle depend on outside grazing and major part of the dung is lost in this grazing fields. Creation of fodder stocks and developing compact fodder fields for house dependent cattle would be of immense help in solving shortage of dung for the plants. Fodder stocks would also help in avoiding distress sales of cattle in a drought year for want of fodder.
USES OF BIO-GAS:

The people should be educated about the uses of bio-gas beyond food making. The reasons for the failure of lighting mechanisms with the bio-gas needs to be explored. The specific problem noticed is that the insects are attracted towards the bio-gas lamp. Further, research should be done to eliminate this problem. The possibility of water lifting with bio-gas at least for household purpose needs to be stressed.

The other uses of bio-gas like refrigeration, jaggery making etc. are alien to the rural people. If mechanism used for this purposes are within the reach of rural people, using bio-gas to other than cooking would brighten up.

ACCOUNTABILITY:

The personnel at work in connection with the establishment of plant, sanction and payment of subsidy, supply of material and equipment should be made accountable for any lapse. Instances of sanction of subsidy to incomplete plants and failure to supply the material and equipment should be severely viewed.
But penalising the personnel for the mistakes which they have committed may demoralise the staff altogether.

MECHANISM:

Further research should be done to find steps to stall the fall of gas production during winter. The rate of failure of bio-gas plants is unbelievably high. The mechanism of bio-gas should be made failure free and research should continue in this connection.

Bio-gas plants technology has continuously been improving for so many years. However, human involvement and input supply such as dung mixing and slurry removing is still based on human hands. In an everchanging and advancing world, involving one's physical body in that agonising act of dung mixing and slurry removing certainly acts like an 'ditterrant irritant.' The technology may be modified and advanced in dung mixing and slurry removing and minimise the human bodily involvement.

TRAINING:

The training of personnel at work at bio-gas plants has hitherto been neglected. Much stress
has to be laid on the training of personnel at work on the plants. Household women and attached labourers are the personnel is to be trained. Household women attending a training camps is almost a taboo in rural India. Hence, the trainers should go to rural areas to meet the demands. The seasonwise and year-wise contracts of attached labourers will come in the way training of personnel at bio-gas plants. Any new attached labourer in any household having bio-gas plant needs to be trained. Hence, the training for each plant need not be confined to one person for one plant.

Any repairs that have to be attended on bio-gas plants also needs training. The NEDCAP should take steps to train village bio-gas workers so that the rural bio-gas plant owners need not come to urban areas in search of repairers who almost squeeze the rural people if asked for any help.

REPAIRS :

NEDCAP, the agency involved and responsible for the spread of bio-gas plants should not shirk its responsibility once the plant is established. Continuous supervision on the plants is of
utmost importance. NEDCAP should take up all types of repairs the plants require.

Any replacement material required for plants need to be supplied at free of cost, if possible or at subsidised cost. The replacement material and equipment needs to be kept at villages so as to avoid the rushing of plant owner to urban areas in search of material and equipment.

The NEDCAP should give guarantee for a fixed period of continuous working of the plant. Such guarantee would certainly encourage the spread of bio-gas plants in the villages.

COMMUNITY PLANTS:

The message and advantages of community plants need to be stressed in the future plans. Small, marginal farmers, land less labourers, artisans and even some of the big farmers cannot afford household plants. The constraint need not be just finance. In such cases establishing community plants would help to accept the bio-gas as their life partner of rural people.