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MANAGEMENT OF NON-CONVENTIONAL ENERGY: THE MISSION OF NEDCAP

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ABSTRACT

India is a country rich in natural resources as well as in population. In order to cater to the needs of ever increasing population, we have to conserve our natural resources by utilizing them carefully. Energy resources are considered to be the most needed resources for the existence of mankind. The conventional energy resources like gas, oil and coal are used everywhere starting from the household chores to industrial activities. As the conventional resources are subject to depletion by nature and cannot be regenerated immediately, there is a rummage around for alternative sources of energy. The government of India has recognized the need for the development and promotion of non-conventional energy resources like solar energy, wind-energy, bio-mass energy etc to conserve conventional resources. Establishment of Non conventional Energy Development Corporation of Andhra Pradesh Limited (NEDCAP) is a milestone in this endeavor. The authors through this article have tried to highlight the importance of non-conventional energy resources and the role of NEDCAP in promoting these sources. This paper also discussed various sources of non-conventional energy and highlighted the efforts of NEDCAP in conservation of conventional sources of energy. The paper is organized into four parts, the first part gives an introduction to the study, the objectives and methodology, the second part gives an account of the non-conventional sources of energy and emergence of NEDCAP as a nodal agency of AP, the third part elaborates the efforts of NEDCAP in promoting non-conventional energy and the fourth part encapsulates a discussion on the study and conclusion..

KEYWORDS

Hydal Power, NEDCAP, Non-conventional Energy, Solar Energy, Wind Energy.

INTRODUCTION

The conventional energy resources are continuously registering a diminishing balance with the population explosion and industrialization-taking place all around the globe. India is the second largest in the world in the statistics of population and considered to be sixth in the consumption of energy as per a study conducted by the Government of A.P. In view of the existence of a large gap between the requirements of the population and the availability of conventional sources of energy there is a need for development of a sustainable resource based alternative for conventional energy resources. The conventional energy resources are the natural resources like coal, oil and gas. With the rapid developments taking place in industrial sector, the need for energy is also increasing constantly. It has become inevitable to supplement the exhaustible resources with renewable resources to cater to the needs of future generations effectively. Fortunately, India is gifted with large amount of sustainable non-conventional energy resources like solar power, wind and biomass along with small hydro power and industrial and domestic wastes. These resources are natural, cost free, available abundantly and readily usable for the generation of energy in different forms. Moreover these are pollution free and hence can be used to produce clean form of energy without any wastage apart from being renewable. So there is a need for the development of non-conventional energy resources in the country.

OBJECTIVES OF THE STUDY

The following objectives were formulated while initiating the study

1. To study the sources of non-conventional energy resources available as alternate sources of energy.
2. To study the role of NEDCAP in promoting non-conventional energy in the state of Andhra Pradesh.
3. To understand the practical problems prevailing in the promotion of alternate sources of energy.
4. To provide some solutions to the problems faced in the conservation of energy and for promotion of non-conventional energy effectively.

METHODOLOGY

The entire study is based on descriptive research or analysis. The data has been collected from both primary and secondary sources. The primary source of data includes conversations with NEDCAP officials and secondary data was gathered from various sources like text books, journals, news papers and websites of NEDCAP. The data gathered was analyzed by understanding the critical elements and arranging that in a chronological order. After that some critical comments were made on the problems faced by NEDCAP in promoting renewable energy, for which some alternative paths of actions have been suggested.

NON-CONVENTIONAL ENERGY RESOURCES

As the demand for power and energy is increasing rapidly and depletion of natural resources is taking place with the same pace, the emergence of environmental friendly and pollution free non-conventional energy resources has become a viable alternative. The non-conventional energy resources like solar energy through thermal as well as photovoltaic systems, wind energy, bio mass, hydal energy and industrial and household wastes will help the economy to a great extent in enhancing the power generation capacity and supplementing the energy needs of different sectors. The following is a brief presentation of the renewable sources of energy.

SOLAR ENERGY

India has a locational advantage in receiving abundant radiant energy form the sun as it is located in the equatorial sun belt of the earth. Majority of the Indian continent is bestowed with clear sunny weather in all most 280-300 days of a year. Daily solar energy incident over India varies from 4-7 KWH per square meter depending on the region. Solar energy can be used in two ways:

SOLAR THERMAL CONVERSION: Conversion of solar energy into heat using devices of steel, copper, aluminum is called solar-thermal conversion. A solar thermal device captures and transfers the heat energy available in the solar radiation. The energy generated can be used for varied applications in the household and industrial sectors like water heating systems, air heating systems, cooking and other household utilities.

SOLAR PHOTOVOLTAIC CONVERSION: This is the conversion of solar energy into electricity using semi conductors and their hybrids to convert the solar energy into Direct Current form of electricity for the application of DC and AC. The electricity thus generated can be used to needs of home lighting, street lighting and running motor pumps etc. The direct current form of solar energy is a major technical consideration for SPV application.

WIND ENERGY

The evolution of windmills to convert wind power into energy, using wind turbines dates back to the beginning of the century. Denmark was the first country to install the first windmill for the generation of electricity. Later many countries entered into the field of wind energy. India started operations during 1983-84. The technology involves generation of electricity using turbines, which converts mechanical energy from the wind mills and is mainly used for pumping water from bore wells, open wells etc .However, average wind speed is major technical consideration to harness wind energy depending upon the climatic conditions and geographical locations of the project.

BIO MASS AND OTHER BIO ENERGY SYSTEMS

Bio mass is yet another renewable source of energy with potential to generate power to the extent of more than 50% of the requirements our country. Indian economy is predominantly an agricultural based economy with the availability of huge quantities of biomass available in the form of husk, straw, shells of coconuts and of wild bushes etc. Bio mass resources include large quantities cattle dung and other organic wastes. The biomass resources can be used for production of thermal energy or electricity. It can also be used to produce gas that may be used for combustion and to run gas engines.

SMALL HYDRO POWER

Hydropower is tapped from running waterfalls, canals and other water streams containing relatively small quantities of water but with some force of falling. The force of falling and flowing water can be converted into electricity by using turbines. This is a cheaper and abundant source on energy in our country. It is estimated that nearly 15,000 MW of power can be generated with the potential of the small hydro projects in the country. This power can be used to meet the requirements of the vicinity areas of the water streams like agro processing and milling.

INDUSTRIAL AND OTHER WASTES

These projects utilize the municipal and industrial wastes which have a problem for their disposal. The cleanliness of urban and industrial areas can be achieved by utilizing these wastes as raw material to generate power. Wastes from the household, agricultural and industrial sectors are utilized to produce electricity. Industrial wastes from sago manufacturing units; sugar manufacturing units, poultries and others can be effectively used to produce power. This is a source of cheaper and renewable energy source available in India. Production of gases can also be undertaken using the wastes.

INITIATIVES FOR CONSERVATION OF ENERGY

Realizing the potential for energy from renewable sources, the government has set up the Ministry of Non-conventional Energy Sources (MNES) in 1992, which is now called MNRE. The Prime Minister directly controls the activities of the ministry. MNRE activities include promotion of renewable energy technologies, creating an environment conducive to promote renewable energy technologies and assessment of renewable energy resources. Various sources of renewable energy are identified and policies are developed to supplement the conventional energy resources under the auspices of the ministry. Nodal agencies with different names have been established in different states to achieve the primary objective of supplementing the energy needs of the states.

NON-CONVENTIONAL ENERGY DEVELOPMENT CORPORATION OF ANDHRA PRADESH LIMITED (NEDCAP)

The nodal agency for the development of non-conventional energy of Andhra pradesh is popularly called NEDCAP. Initially the name is Agro Pump sets & Implements Ltd., (APIL) for implementing non-conventional energy programmes sponsored by both the State and Central Governments. The corporation was incorporated on 21.10.1969 and has been renamed as NEDCAP on 10-5-1986. The vision and mission statements of the organization are as mentioned under.

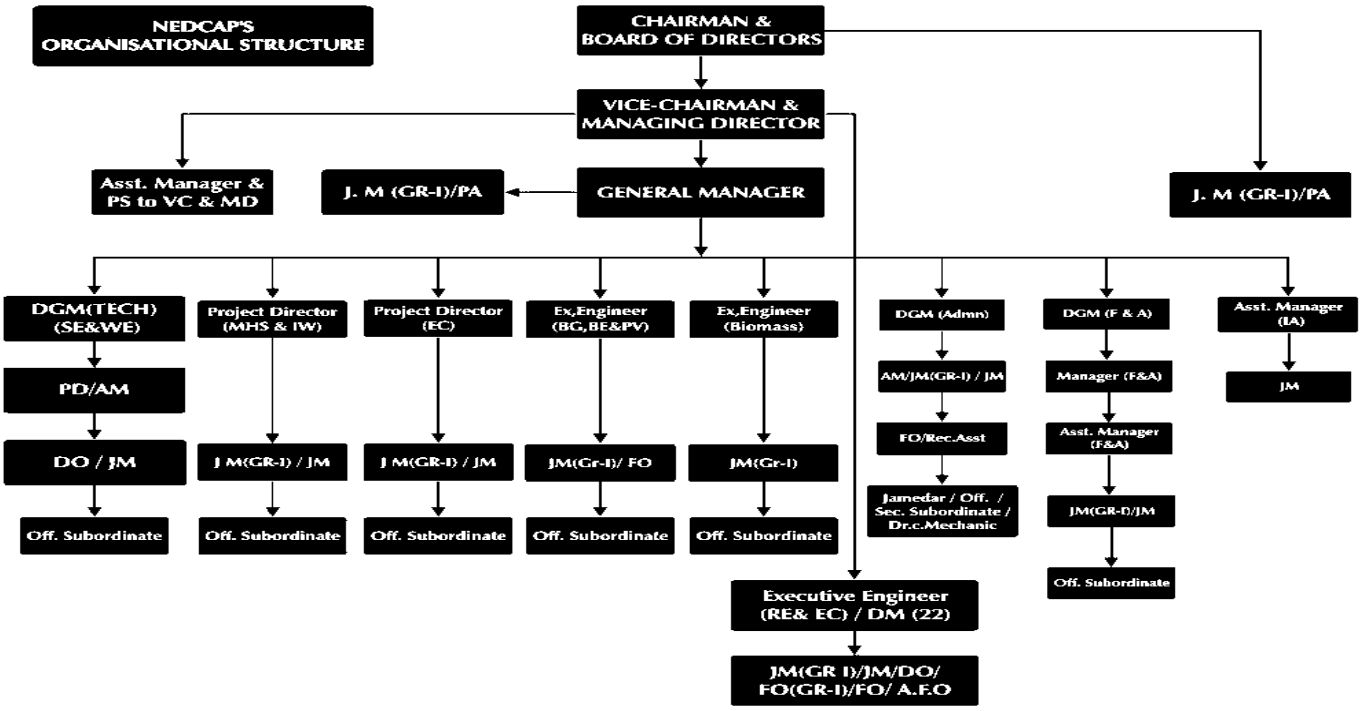
The vision of NEDCAP is to be a pioneer institute in the area of promotion of Non-conventional / Renewable energy projects with state-of-art technologies coupled with experts and technocrats to present highly competitive and efficient products to the consumer."

The mission is to promote, develop, encourage, popularize and carry out consultancy, field research and experiments for implementation of Non-conventional / Renewable energy projects and gadgets sponsored by both State and Central Governments.

The primary objectives of the Corporation are

- To survey, develop and implement renewable energy programmes of the State and Central Governments.
- To generate electricity through renewable sources like wind and solar energy on a decentralised manner.
- To conserve the sources of energy in rural areas.
- To import and adopt viable technology and machinery in the areas of Non-Conventional energy sources and ensures post installation service.
- To impart training and to promote research and development in the field of Non-conventional energy sources.
- To provide technical consultancy services in implementation of power projects through renewable energy sources.

The organization chart showing the hierarchy of NEDCAP is presented hereunder.



Source: www.nedcap.org.in

INITIATIVES OF NEDCAP

To achieve the above mentioned objectives, NEDCAP has initiated many programmes in different areas of non-conventional energy sources. The programmes are continuously monitored and necessary support is extended to individuals, non-profit making organizations, commercial and industrial organizations working in various projects associated with renewable energy resources. The following are some highlights of the promotion measures initiated by NEDCAP.

PROMOTION OF SOLAR ENERGY

Government of Andhra Pradesh has issued GOs under reference Nos. G.O.Ms.No.302 M.A. dated : 03.08.2004 and G.O.Ms.No.506 MA dated: 03-12.2004 of Municipal Administration & Urban Development (M) Department making mandatory for installation of Solar Water Heating Systems at proposed construction of hospitals, nursing homes, hotels, guest houses, lodges and multi-storied buildings of stilt + 5 floors or 15 meters and above height provision shall be made in their plans. NEDCAP is taking all necessary initiatives in the implementation of the programme. It is providing subsidized loans with banks at concessional rates of interests.

Type of Users	Rate of interest applicable
Domestic users	2%
Institutional users not availing accelerated depreciation	3%
Industrial and commercial users availing depreciation	5%

Source: www.nedcap.gov.in

Along with the provision of loans at concessional rates of interest, NEDCAP is also providing capital subsides for those organizations which are not availing the facility of soft loans depending on the type of the organization and the area used for collecting the solar energy. The subsidies are Rs. 1100 per square meter of the collector area for registered non-profit making organisations and Rs.825 per square meter of the collector area for registered commercial establishments. Further it is providing and incentive of Rs. 100 per square meter for motivators and agents working in the field of attracting potential buyers of the solar water heaters.

PROMOTION OF WIND ENERGY

Based on the studies conducted through wind monitoring exercise, it is found that the southern part of Andhra Pradesh has got wind potential for setting up of wind farms. The areas in Anantapur, Cuddapah, Kurnool and parts of Nellore and Chittoor district have been identified with relatively better potential sites to set up wind power projects. In the master plan to assess the potentiality in southern part of A.P. it is estimated that there is a potential of about 2100 MW capacity. NEDCAP has established 2.25 MW wind farm project at Kondamedapally, Kurnool dist. and 2.50 MW wind farm at Narasimhakonda, Nellore district under demonstration scheme of MNRE. To encourage investment and to promote wind power projects in Andhra Pradesh, the Govt.of Andhra Pradesh has announced a comprehensive policy and incentives to set up wind power projects in private sector. NEDCAP is the single window clearance agency to sanction projects up to 20 MW capacity in the State and so far 100.12 MW capacity of projects by 30 developers at Ramagiri, Kadavakallu, Tallimadugula in Anantapur District and on Tirumala Hills, Chittoor district, was commissioned. The total installed capacity is 107.37 MWs as on March, 2008.

NEDCAP extends the following services to the wind farm developers to set up projects in private sector

- Clearance of projects.
- Selection of suitable sites for the proposed projects.
- Providing data related to the speed of the wind and related parameters.
- Guidance on suitable equipment needed , its erection and commissioning of the project.
- Guidance on inter-facing of the project .
- Co-ordination with the revenue department on the land allotment to the proposed projects.
- Necessary technical assistance to the projects sanctioned and to the ones commissioned.

A total of 0.25% of the project cost subject to a minimum Rs.1.50 lakhs / MW is payable to NEDCAP towards sanction fee of the project.

PROMOTION OF BIOMASS UTILIZATION

After identifying the abundant availability of bio mass in the state of Andhra Pradesh NEDCAP has started implementing the Biogas programme since 1982-83. The initial stages of implementing the programme, 4 cum 6 cum capacity KVIC model biogas plants were erected. It has been observed that KVIC models of biogas plants are comparatively associated with high initial costs along with periodical maintenance. Since, 1990-91, the Corporation is promoting the Deenabandhu model as it is less expensive and more efficient. The programme gained momentum and the same model is continued. The Corporation till now has installed around 2.50 lakhs biogas plants in the state so far. Under the biomass programme rural energy programmes are designed and implemented.

RURAL ENERGY PROGRAMME

Sl.No.	**Description**	**Nos. Installed**
1	Family Size Biogas Plants for cooking	2.8 Lakhs
2	Improved Chulhas	27.28 lakhs

Source: www.nedcap.gov.in

NATIONAL PROJECT ON BIOGAS DEVELOPMENT

Basing on the studies conducted and on the success of the plants already installed in Andhra Pradesh, there is huge demand/potential for the establishment of Biogas Plants in Andhra Pradesh. The estimated potential of family size biogas plants is 10.90 lakhs. So far 2.84 lakh family-size biogas plants have been installed in the state.

PROMOTION OF INDUSTRIAL WASTE BASED PROJECTS

NEDCAP is authorized by the A.P. State Government vide. G.O. Ms. No. 253, E & F (RES) Department, dated 15-11-94 to sanction the Municipal Solid Waste/Industrial Waste based Power projects of capacity up to 20 MW. Andhra Pradesh is having a number of Industries which generate effluents. These effluents are to be treated to have value added products. The waste generated from Industries like sago, starch, palm oil, distilleries, dairy, vegetable wastes and poultry etc can be treated to generate Electricity. The following table presents the total capacity of the power generation projects undertaken in the industrial waste management area.

	Type of Project	Capacity
i)	Municipal Solid Waste Projects	107 MW
ii)	Municipal Liquid Waste	16 MW
	Total	123 MW
iii)	Industrial Waste Projects	135.0 MW

Source: www.aponlineltd.org

It is estimated that there is a huge potential of 40 MW from municipal solid wastes in the cities of Hyderabad, Vijayawada, Visakhapatnam, Guntur. Two projects aggregating to a capacity of 12.6 MW are under implementation at Hyderabad and Vijayawada cities. It is estimated that there is still an untapped potential of 135 MW from industrial wastes including poultry, distilleries and others industries operating in the state. Out of this potential projects with a capacity of 1.50 MW have been commissioned.

SMALL HYDRO POWER

The activity of power generation from small hydro power has been transferred from AP TRANSCO wing which was previously known as APSEB to NEDCAP vide G.O.Ms.No.37 dated 01-02-1999 of Energy (Power I) Department, Government of AP. The assessed Hydro Power potential is 1000 MW (approx). The status report on Small Hydro Power projects is shown in the table.

Status of small hydro power projects as on 31-03-2008

S.No.	Description	No. of projects	Capacity in MW
1	No. of projects sanctioned	47	146.603
2	No. of projects commissioned	31	92.353
3	No. of projects under progress	05	7.150
4	No. of projects – Financial closure not completed	11	47.100
5	Detailed project reports referred to Irrigation Dept. for issuance of No Objection Certificate	125	305.500

Source: www.nedcap.gov.in

The total no. of projects sanctioned are 47in number with a capacity of 146.603MW. The capacity utilized so far is 92.353 MW through 31 projects commissioned under private sector participation. The number if Projects, which are in progress, is 16 with a capacity of 54.250 MW. The proposals and detailed project reports referred to Irrigation Department for issuance of No Objection Certificate are aggregating to a total capacity of 305.500 MW.

DISCUSSIONS ON THE OBSERVATIONS

Andhra Pradesh is one of the pioneering states in the country in encouraging the non-conventional energy based power projects. The State Government has authorized the nodal agency NEDCAP to sanction NCES based power projects of capacity up to 20 MW in private sector also along with the public sector participation. The cumulative installed capacity as on 31.10.2003 is 473.09 MW which is about 4.6 % of the total installed capacity in the state. During the year 2002-03, 1287.55 Mega Units of power was fed into the State grid which is 3.65 % of the total volume of power generated in the state. The Non Conventional Energy based power projects have the following advantages

- Environmental friendly and produce green power with less costs and free raw material.
- Every KWH of power generated from NCES will eliminate 1 KG of Carbon emission into the atmosphere which is relatively very less when compared with conventional sources like coal, oil and natural gas.
- Non Conventional Energy Sources are abundantly available and are renewable with in no period of time.
- Low gestation period is another advantages with the projects commissioned under the utilization of non-conventional sources.
- Also concerned with conserving the rapidly depleting reserves of fossil fuels.
- Supportive in creating rural employment and self employment opportunities.
- Ready to lend a hand in improving the economic and living conditions of the rural population.

CHALLENGES FACED BY NEDCAP

1. The most important source of renewable energy is solar energy. As India is having abundant potential for capturing solar energy, the scope of using the solar power as alternate source is very large. But, the cost of erecting solar energy equipments like solar lanterns, solar voltaic cells and solar heaters is hindering the promotion of solar energy. Solar appliances are less popular in major parts of the country.
2. Another hindering block in the development of non-conventional energy is the maintenance of projects. Projects like bio-mass utilization are doing well in the season when agricultural waste is available abundantly, but at times of scarcity, the maintenance is becoming a setback. Another problem faced is the storage of agricultural wastes. If proper care is not taken in storing the agricultural wastes they may convert the surroundings unhealthy.
3. Hydal power projects are also highly dependent on conducive environment. At times, because of cyclones and other unforeseen changes in the environment, the equipment set for the use of hydal power gets damaged and becomes ineffectual. The cost of the equipment is high and replacing the equipment every time is not practically feasible. It is also observed that the cost of transmission of power produced through these projects is relatively high when compared to other forms of energy.
4. Wind energy is also highly dependent on the environment. When wind energy ranges from normal to the desired level, the production of energy is optimum, but when there are winds with high velocity they may damage the power producing equipment causing a loss to the project. Similarly in some of the areas, the wind mills were unable to generate the estimated capacity of energy due to low velocity of the winds than expected velocity and thus causing a loss to the establishment or the agency.
5. Industrial waste based projects should also be handled with utmost care as there every possibility for polluting the environment in the utilization of wastes. Sometimes the gases released during some chemical treatments are accidentally released into the surroundings causing havoc among the population of the vicinities.

SOME SUGGESTIONS

1. It is observed that establishment of solar heaters and other equipment is associated with huge costs. In house hold sector the users can form into a group and share the expenditure of erecting the equipment and maintenance of the same. In industries also the users can form into clusters and share the expenses. This can be an alternative solution for bearing the costs rather than bearing them alone.
2. Regarding the storage of agricultural waste, farmers cam make use of the idle lands and nearby vicinities without causing any disturbance to the households. The government can come forward and suggest some amicable solutions with the help of officials of agricultural and forestry departments.
3. The hydal power projects have to be aware of the information passed from the department meteorology to protect the equipment from damage. They can have continuous contacts with the department officials to be aware of the changes taking place in the environment.

4. Wind mills can also be effectively used by sharing the cost of equipment between the establishing organisations and end users of the energy produced. The project managers should also be aware of the changes taking place in the day to day by being updated with the latest weather reports to protect their projects from damage.
5. Along with promotion of non-conventional energy, conservation of natural sources of energy like water, oil, coal and fossil fuels should be highlighted. More awareness can be created among the households and industrial users for conservative use of energy in their daily chores. It should be clearly indicated in the industries where there is a possibility for wastage that " **Energy Saved is Energy Produced.**"
6. Another lacuna observed is the lack of promotion for the non-conventional forms of energy sources and their utilization. If the government and non-government agencies adopt appropriate strategies for the promotion of renewable energy , it will help in escalating the number of industrial and household users. Each and every piece of information given by the government for promotion of renewable source should reach the potential users by apt promotional strategies.

CONCLUSION

The importance of non-conventional energy resources is gaining impetus in the country as well as in the state. India is now one of the countries that are implementing various programmes on the utilization and promotion of non-conventional energy resources. Rightly identifying the need of the hour for conservation of energy resources, the Planning Commission of India in its Integrated Energy Policy Report (IEPR) has highlighted the need to develop domestic supply options and diversification of energy sources. The projections of the report state that non-conventional sources may account for 5 to 6 per cent of India's total energy mix by 2031-32. As the Nodal agency of the state of Andhra Pradesh, NEDCAP is taking all the necessary initiatives to promote the use of renewable sources of energy like solar, wind, biomass, industrial wastes etc, as evident from the above discussion. Private participation is also solicited in some of the areas like power generation and solar heating systems. To become more effective in the promotion, NEDCAP can also undertake promotional and publicity campaigns for individuals, NGOs, commercial and non-commercial institutions, elaborating the importance of the conservation of conventional sources of energy and the need for supplementing them with non-conventional sources. To finish with, it is rightly said that **"Save Nature and Enjoy the Future."**

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