

# RURAL ENERGY

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# INTRODUCTION

- Agriculture is the mainstay of India economy, providing livelihood to more than 50 percent of the country's population.
- Need of energy policy guidelines
- Energy requirement for the agriculture sector have to be met in a planned and systematic manner

## CHANGES IN THE PATTERN OF ENERGY CONSUMPTION

Primary Energy			Final Commercial Energy				
Year	Commercial	Non-commercial	Coal	Pet. Prod.	Nat. Gas	Electr.	Total
1953-54	28.4	71.6	80.1	16.7	0.0	3.2	100.0
1960-61	34.7	65.3	75.3	19.9	0.0	4.8	100.0
1970-71	40.6	59.4	56.1	34.1	0.6	9.2	100.0
1980-81	47.5	52.5	47.9	40.3	1.1	10.7	100.0
1990-91	59.9	40.1	35.9	43.6	5.5	15.0	100.0
1996-97	67.7	32.3	29.3	46.8	6.9	17.0	100.0

# SOME FACTS

- The majority of the population of the country's population is a major objective of the integrated sustainable energy policy for India.
- More than two third of country's population , except in some selected areas, have remained trapped in a subsistence economy based on commercial energy sources like firewood, animal dung and agricultural wastes.
- 75 % of the total energy consumption in the rural areas continues to remain in the household sector, amily to meet cooking requirments

# NEED FOR RURAL ENERGY POLICY IN INDIA

- India is second most populous nation in the world with an extremely diversification ecology
- Almost 80% of the total energy consumption is in the domestic sector. To meet their cooking energy requirement .
- Conventional energy source meet almost 60% of the total energy consumption in the country.
- Rural energy systems are further strained by the inability of the people to shift to commercial fuel like electricity, LPG and kerosene due to low purchasing power of the people and limited availability of these fuel.
- In order to redress these problems, several efforts have made, both by Govt. and non Govt. organization

# ISSUE IN THE PREPARATION OF RURAL ENERGY POLICY FOR INDIA

- ❑ Technology choice
  - Techno economical
  - Adhoc
  - Sporadic
  - Sub-optimal
- ❑ Implementation mechanism- development programs
- ❑ Role of market- barriers for commercialization
  - Technical, financial, social, institutional..etc
- ❑ Capacity building

# RURAL ENERGY PATTERN

- Requirement of the energy inputs in the rural sector for households, production, agriculture, cottage, industries and agro- processing fall in the broad categories of subsistence and productive needs.
- More than 60% of Indian house holding depend on traditional sources of energy like fuel wood and crop residues for meeting their cooking and heating needs.
- Rural energy needs are different than the urban needs due to economic disparities.

## Progress of Farm Mechanization in India (1970-93)

	1970	1980	1988	1993
Gross cropped area (mha)	165.8	169.7	177.0	183
Tractors-cumulative totals (million)	0.1	0.473	1.054	1.8
Per million hectares of gross cropped area	610	2790	5950	9860
Oil engines-cumulative totals (million)	--	2.654	4.250	5.2
Per million hectares of gross cropped area	--	15640	24000	28490
Irrigation pumps, electrically-operated tube wells-cumulative total (million)	1.354	3.965	7.000	9.620
Per million hectares of gross cropped area	8340	23360	399950	52710
Consumption of power (kWh) for irrigation per thousand hectares of gross cropped area	23.3	79.5	196.7	350.7



# DIFFERENT TYPE OF ENERGY USED IN THE RURAL SECTOR

- Human Power
- Draught animal power
- Mechanical power
- Renewable energy
- Biofuels

# ENERGY AND AGRICULTURE IN INDIA

- Agriculture has been , and continues to be, the mainstay of the Indian economy.
- The predominate end-uses which directly consume energy in agriculture are land preparation, irrigation intercultural operations and harvesting .seeds, organic manure , chemical fertilizer, pesticides and the like can be considered as indirect energy input since they require substantial amounts of commercial energy inputs during production.
- Transformation in the country's agricultural scenario consequent to the green revolution of the mid 1960's. Modern technology , involving the use of high yield of variety seeds; expansion of irrigation facility, increment in fertilization use, agrochemical and rapid mechanization.
- Increased use of energy has been the high incidence of the droughts. consumption of electricity in agriculture, oil consumption, diesel consumption.
- Rural electrification for farmer. The state government to have subsidized flat rate tariff on electric pumpsets based on horse power. The agricultural sector entails high transmission and distribution loss.

- The rapid increase in farm mechanization
- Tractors are being used for a variety of jobs like:-  
Tillage, sowing, weeding, harvesting, transport and stationary jobs (like irrigation, threshing, chaff, cutting etc).
- Diesel engines and electric motors are used mainly for water lifting and to a limited extent for stationary operations, such as: threshing, grain cleaning, milling and crushing.
- Indian agriculture depend on great extent on animal energy:- Tillage, sowing, interculture and threshing and water lifting.
- Wood is most important energy source in India. Forest degrading gradually. The biomass energy programme comprising biomass production, biogas, improved chulas, gasifiers and solar energy for saving environment.

# RENEWABLE ENERGY

- Renewable energy sources –solar, wind and biomass have the potential to be utilized as supplementary energy sources in rural areas.
- ❖ Renewable energy in the rural sector
- ❖ Rural energy forms ( Animal energy and human Energy)
- ❖ Draught animals
- ❖ Energy from biomass
- ❖ Biogas
- ❖ Producer gas
- ❖ Alcohol
- ❖ Bio- Diesel
- ❖ Co- Generation
- ❖ Solar energy
- ❖ Small hydro

## Estimated Annual Amount of Crop Residues Produced in India

Residues	(Million Tonnes)	
<i>Field-based residues</i>	1994	2010
Rice Straw	214.35	284.99
Wheat Straw	103.48	159.98
Millet Straw	19.42	17.77
Maize Stalks	18.98	29.07
Cassava Stalks	0.36	0.40
Cotton Stalks	19.39	30.79
Soybean (Straw + Pods)	12.87	34.87
Jute Stalks	4.58	1.21
Sugarcane Tops	68.12	117.97
Cocoa Pods	0.01	0.01
Groundnut Straw	19.00	23.16
<b>Sub-total</b>	<b>480.55</b>	<b>700.22</b>
<i>Processing-based residues</i>		
Rice Husk	32.57	43.31
Rice Bran	10.13	13.46
Maize Cob	2.59	3.97
Maize Husks	1.90	2.91
Coconut Shells	0.94	1.50
Coconut Husks	3.27	5.22
Groundnut Husks	3.94	4.80
Sugarcane Bagasse	65.84	114.04
Coffee Husk	0.36	0.28
<b>Sub-total</b>	<b>121.53</b>	<b>189.48</b>

# RURAL ELECTRIFICATION

- Rural electrification is prime mover of rural development. Electricity is not only the basic prerequisite for industrialization it is also contributes significantly to increase agricultural productivity
- Government of India has notified a change in the definition of village electrification as follows: a village will be deemed to be electrified if electricity is used in the inhabitate locality , with in the previous boundary of the village for any purpose whatsoever.
- In spite of the large scale pumpsets energization programme, the prevailing low tariff for agriculture does not provide any incentive to the farmer to adopt energy –efficient measure to optimization of consumption of energy.
- A large number of pumpsets are of sub-standard quality and operate with sub-optimal efficiency .
- Rural areas are facing serious problems regarding quality and reliable electricity supply

# Co-generation Potential in India

Industry	Potential (MW)
Alumina	59
Caustic Soda	394
Cement	78-100
Cotton Textiles	506
Iron and Steel	362
Manmade Fibers	144
Breweries	250-400
Commercial Sector	200
Dairies	175-350
Distilleries	70
Fertilizer	2900
Petro-chemical	850-1000
Ply Used Industry	50
Rice Mills	1000
Solvent Extraction	220-350
Sponge Iron	225
Tyre Plants	160-200
Paper and Pulp	850
Refineries	232
Sugar	5200
Sulphuric Acid	74-105

# A NEW APPROACH TO THE INTEGRATED RURAL ENERGY POLICY PLANNING AND PROGRAMMES

- New approach and design for an integrated rural energy programme is required to achieve the goal of sustainable energy security for all , in the coming decades.
- Take model projects in selected cluster of villages.
- The role of technologies in improving efficiency and also sustainability of existing rural energy sources to meet different end-uses also has to be strengthened.
- The new integrated rural energy programme would have the following features:



# NEW INTEGRATED RURAL ENERGY PROGRAMME

- i. To provide for minimum domestic energy needs for cooking , heating and lighting to rural people in IREP micro region.
- ii. To provide the most cost effective mix of various energy sources and option to meet requirements of sustainable agriculture and rural development with due regard to environmental considerations.
- iii. To development linkages between rural energy and sustainable agriculture and rural development so as to work out energy requirements for improvement.
- iv. To ensure people's participation participation in the planning and implementation of IREP plans.
- v. To strength linkage of micro-level planning for rural energy with with national and state level planning and programme for energy and economic development.
- vi. To setup technology transfer mechanisms which will result in development and promotion of cost effective and environment-friendly technologies.
- vii. To ensure that the sustainability aspects are duly taken into account in the integrated rural energy programmes and plans by incorporating environmental

# CONCLUSION

- Human, animal, and mechanical energy are extensively used in agriculture for production and processing, and industrial and home applications. Rural energy needs are met by bio-energy, natural energy, electricity, fossil fuels and coal etc.
- Energy is key input to agriculture production aimed at ensuring food and ecological security and most important and improving the standard of living of the rural people.
- Biomass and the integrated frame work would ensure that the requirement of energy for agricultural production, processing and rural development are cost effectively met through a mix of energy efficient commercial energy and renewable energy sources.
- New integrated rural policy and security need to be designed, development and operationalized. The planning and implementation of the new integrated rural energy programme needs to be taken up as a part of the new integrated sustainable energy policy and the national sustainable energy security systems.