

Discussed the components of Techno-Economic via way of means of the use of mechanisms and modulation withinside the Power Generation from Agri waste merchandise at the floor of India

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Abstract

The general power intake in India steadily improved from 641 million tonnes of oil equivalent (Mtoe) in 1973 to four hundred mtoe with the aid of using 2001, indicating steady boom. As fossil fuels (nonrenewable) are depleting, those are to get replaced with the aid of using renewable assets including Agri wastes, wind, solar, hydel, and tidal. Problems of the developing abundance of agro-waste in exceptional components of the united states of America, environmental pollutants as a consequence of the burning of agro-waste, and problems associated with beside the point land use, all upload urgency to the demanding situations confronted in constructing sustainable and environmentally sound power systems.

While each attempt is being made to bridge the distance among call for and deliver, there exist diverse technological and environmental obstacles to accomplishing the identical in practice. This observe evaluates the capability of agro-waste strength technology technologies, a shape of use of agro waste, pre-conversion methods, utilization, and its contribution to the discount of environmental pollutants, with a focal point at the Northern region (India) (states like Punjab, Haryana, Rajasthan, Himachal Pradesh, Uttar Pradesh). An agricultural residues survey turned into executed to cowl the rice, wheat, maize, sugarcane, and cotton plants, each for the Rabi and Kharif seasons. Samples have been amassed from exceptional regions according with the agroecological zones. Estimates for Agri wastes for exceptional ecological zones have been made primarily based totally at the ratios among the crop length and agricultural residues.

This listing of essential plants turned into in addition supplemented with the aid of using waste forestry substances like leaves twigs and grass. Some of the commercial wastes, specially agro-primarily based totally that may probably be used as binders cum fuels like de-oiled cake, spent wash (liquid and dry) mallee, biofertilizer, sawdust, or even Bakelite have been taken into consideration. While calorific fee and different combustion parameters have been frequently recognized for the essential plants most of these have been calculated for the supplementary substances or even plants anywhere necessary. Jalkheri plant (10 MW) is the use of rice straw” in a fluidized mattress combustion device Nuchem Powers Ltd (four MW) makes use of mustard stalks and cotton stalks and rice straw withinside the stoker fired device. The essential problems of essential difficulty for that vegetation is the nonavailability of agro wastes, agglomeration, ash slagging, and social and control troubles associated with the collection, handling, transportation, and garage of Agri waste.

Key words: Agri waste, agglomeration, biofertilizer, fossil fuels, environmental obstacles.

Introduction

India is an agriculture-primarily based totally economy, 70% of its GDP comes from both agriculture or agro-primarily based totally enterprise. Any enhancement of profits from this zone is primarily based totally upon an good enough deliver of fundamental inputs on this Sector. A everyday and good enough strength deliver is one such input. But the popularity of the strength deliver in our united states of America is deteriorating each day with a primary percentage of strength produced being dispatched to the enterprise and concrete regions. Hence, there's a perennial scarcity of strength withinside the agriculture zone. Consequently, there's an pressing want to provide greater strength, so as to satisfy the wishes of the agriculture zone effectively. Energy intake in India steadily improved from sixty-five million tonnes of oil equivalent (Mtoe) in 1973 to four hundred mtoe with the aid of using 2001, displaying a boom fee of over 8 percentage for the duration of the whole period.

Though there's no true facts to be had with reference to the amount of agricultural and agro-business residues, its difficult estimate may be positioned at approximately 350 million tones (mt) in keeping with year. It is likewise expected that the full livestock refuse generated is sort of 250 mt in keeping with year. Further, almost 20% of the full land is beneath Neath wooded area cowl, which produces about 50 mt of gas wooden and with related wooded area waste of approximately five mt.

The general availability of agro waste, power plantations, and agro-business waste within the United States of America is positioned at around 405mt in keeping with year.

The ever-growing want and call for power; especially electric strength power: and the short tempo of depletion of fossil fuels had focused the eye of the sector toward non-traditional power assets. Biomass in widespread and agro waste particularly is being taken into consideration as one of the options with probably the very best capability. During the remaining 3 a long-time quantity of researchers, academicians, experts, professionals, and directors have researched and deliberated at the problems involved with this factor and different associated problems like price economics, efficiencies, environmental impact, etc.

Processing and Briquetting of the Agri waste

An agricultural residues survey turned into executed to cover the cotton, sugarcane maize, rice, and wheat plants, each for the rabi and Kharif seasons. Samples have been drawn from exceptional regions according with agro-climatic zones and for exceptional productiveness conditions. These samples have been oven dried beneath special conditions, and their resultant residual gas values have been calculated. Ratios among crop length and the rural residues have been developed, and estimates for exceptional agroecological zones, and on the provincial levels, have been made. The expected portions of crop residues and category primarily based totally on shapes & sizes are given in Table.

Table: Food grains productions (*Million tonnes*)

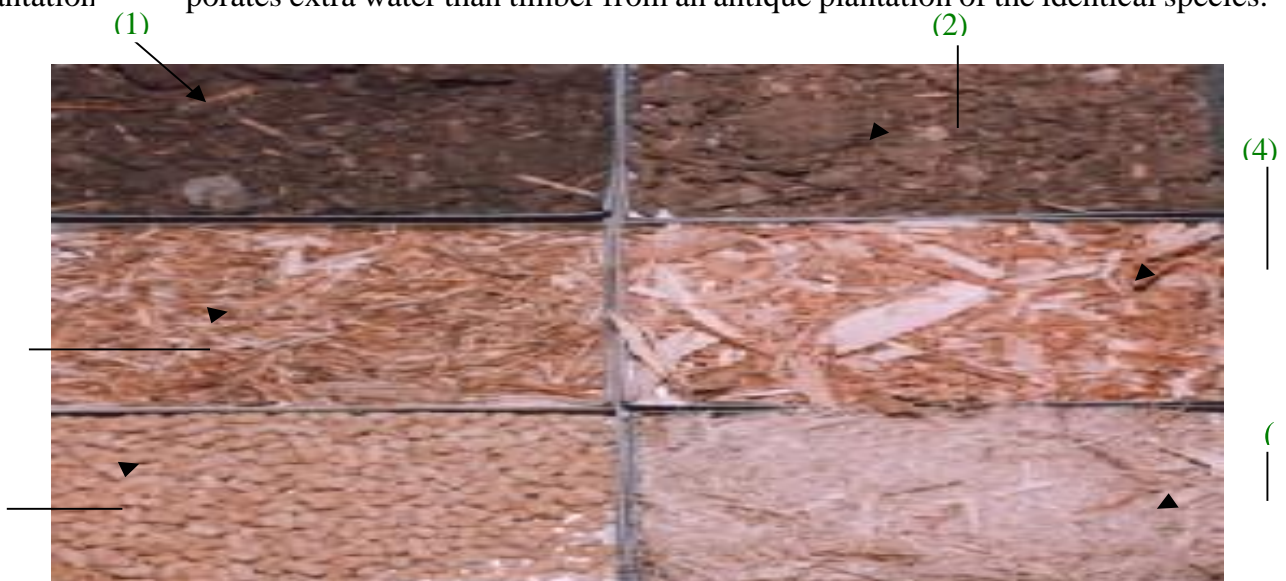
Crop/Year	1999-00	2000-01	2001-02	2002-03	2003-04*
Rice	89.7	85.0	83.3	72.7	86.4
Wheat	76.4	69.7	72.8	65.1	72.7
Coarse cereals	30.3	31.1	33.4	25.3	36.8
Pulses	13.4	11.1	13.4	11.1	14.9
Food grains (cereals, rice, wheat, coarse cereals, gram)					
Kharif	105.5	102.1	112.1	87.8	110.5
Rabi	104.3	94.7	100.8	86.4	100.3
Total	209.8	196.8	212.9	174.2	210.8

* *Third advance estimates, Source: Economic Survey 2003-04, annual conducted by the Deptt. of Economic Affairs by Ministry of Finance, Govt. of India*

Availability of Agricultural Wastes

Agriculture is the most important supply of earnings and employment for maximum of the agricultural populace withinside the country. Increased agricultural productiveness is related to improved biomass materials which may be transformed into excessive grade electricity reasserts with cutting-edge technology. Such conversion is manifestly most desirable from a cost-effective and environmental angle as in comparison to different electricity transport structures including imported fossil fuels. In India, agricultural residues are the maximum plentiful form of wastes to be had withinside the country. The most important agricultural residues produced on this area are wheat straw, rice husk and straw, residues from cotton and arhar plantations, sugarcane, bagasse, stem, trash, floor nut shells, grass, coco shell, noticed dirt and animal residues.

Agri waste substances are distinctly unstable in comparison to coal. Over 80% of the heating fee of Agri waste gas is acquired from its unstable matter. Moisture content material of Agri waste relies upon now no longer handiest on herbal situations however additionally the storing situations – whether or not saved in ponds or on dry decks. In general, Agri residue from younger plantations incorporates extra water than timber from an antique plantation of the identical species.



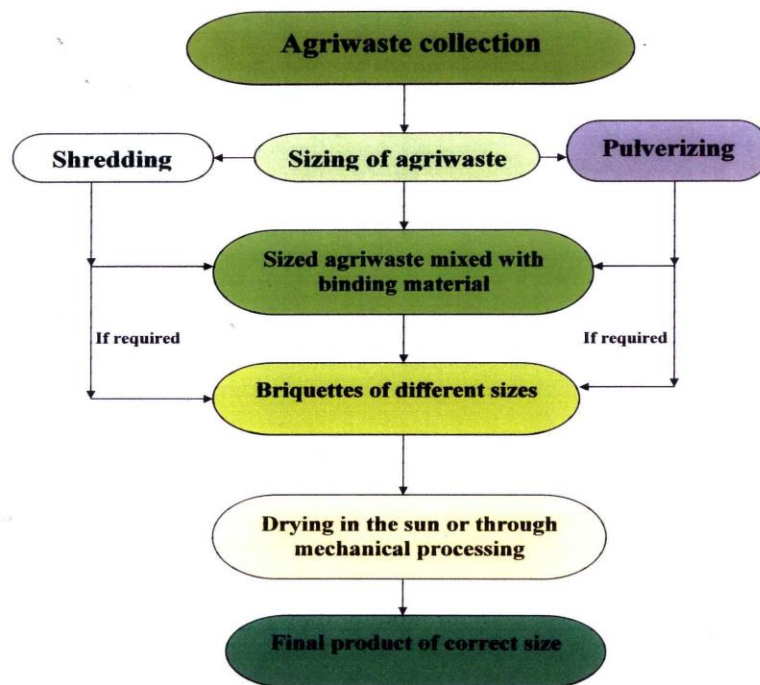
ig. 1 shows raw material mailee. Fig. 2, Mailee local. Fig. 3 mustard straw.
Fig. 4 Wood chips. Fig. 5 deoiled cake (DOC). Fig. 6 Bagassee

Water contained within the Agri waste provides to its transportation cost. An boom within the moisture content material from 10 to 30% in straw decreases its calorific fee through 28%. The calorific fee or warmth of combustion for a given quantity of Agri waste cloth is typically decided through its chemical composition, moisture content material, and particular gravity.

Feed Preparation Flow Chart

These substances have been blended with binders or without binders. Fuel briquettes of 1, 2, 3, four, inch dice and three x 2 x 1 cuboid length have been organized with the assist of common trying out device making use of five to four kn of load. Raw substances are proven in discern and gas briquettes in discern. These Combinations have been examined for his or her for calorific fee, moisture content material, unstable content material and ash content material.

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Results and Discussion

The take a look at become initiated with the motive of exploring the opportunity of making use of the Agri wastes as gasoline in diverse mixtures, especially for energy technology purposes. The take a look at concerned scanning for Agri wastes for the primary vegetation of the place;

locating the calorific values and different associated parameters for a number of the substances used as gasoline dietary supplements and binders. Case take a look at of the 2 Agri waste energy technology flora; briquetting of Agri waste in diverse mixtures and locating their associated parameters; designing and fabricating a fluidized mattress combustor and checking out all of the composite fuels organized for his or her thermal performance that stepped forward from 20-25% and environmental sustaining/development efforts.

The particular outcomes for every of those steps had been given of their respective chapters. The wide inferences of the complete take a look at are summed up here. The take a look at discovered that there's sufficient capacity of Agri waste to be tapped to fulfill the distance withinside the strength necessities withinside the use as an entire and specially withinside the Northern place i.e. Punjab, Haryana, Himachal, Uttaranchal, Rajasthan.

The flora beneath Neath takes a look at have been working among 65% - 85% plant load factors (PLF). The ordinary efficiencies of the energy flora have been among 16.10 – 25.10% (case take a look at-I). The said thermal performance of appropriate flora withinside the evolved international locations are upto 35%. So plenty needs to be completed to enhance the operational performance of the flora. With admire to the economic system of the method, the funding fees, the gasoline fee and the once-a-year complete load working hours had been diagnosed because the maximum critical influencing factors. The type of Agri waste used and the respective gasoline fee have a robust affect at the economic system. In addition, at the least four,000 annual complete load working hours should be accomplished from an Agri waste plant for a financial operation, five,000 to 7000 annual complete load working hours are advocated for decentralized agriwaste flora in warmness managed operation. 2-10 MW is appropriate capability variety for such initiatives. A five MW capability task is the maximum feasible having funding of Rs. four.four crores/MW towards Rs. 6.6 crore/MW for 10 MW unit and Rs.9.00 crore/MW for two MW unit. In case of regions with excessive populace in addition to crop density, 10 MW initiatives ought to be considered. On the opposite hand, in very skinny populace (kandi and border) regions, the greater appropriate opportunity can be 2 MW station.

- The energy flora primarily based totally on agriwastes are in popular technically and economically feasible proposition. They want extra care on the operation stage (Case take a look at I & II).

- The initiatives are greater appropriate as captive and/or as cluster initiatives (1 MW or 2 MW energy flora for cluster of 20-30 villages). (Annexure-E, Refer to chapter-1 and casestudies). They can complement the energy to the present grids.
- The financial viability of the Plant is higher if it's far in personal area. The comparative performances of flora beneathneath the case research monitor the facts (currently Jalkheri Power Plant Ltd. And Nuchom Power Plant are running in personal area).
- Use of unmarried fuels specially rice straw outcomes in agglomeration clinker formation and slagging because of alkaline nature of the gasoline (case research I & II and Operation guide of BHEL).

The projected 25% contribution [GOI, 81, 82] from Agri waste-energy to strength technology will cross a protracted manner to easing the awful energy state of affairs withinside the place. The blessings will be a couple of in phrases of averted environmental harm from substituted fossil gasoline reasserts, rural improvement, employment technology, stepped forward strength security, and in popular phrases a pass to a greater sustainable strength production. Clearly, Agri waste will most effective be a element this is an increasing number of primarily based totally on renewable resources.

The assist of Agri waste energy is essential in growing sustainable, low-carbon alternatives for the long-time period incentives. Agri waste energy will have a tendency to be greater high-priced than different renewable strength reasserts, along with wind, however is possibly to compete with destiny fees of strength from fossil reasserts, especially if environmental fees also are accounted [31, 36, 38, 54, 61, 64, 81, 82]. The decentralized nature of Agri waste energy possibly to bring about financial savings and blessings with reference to strength transmission and distribution. These want to be accounted via right governmental strength area regulation.

Continued studies improvement and demonstration (RD&D) associated with stepped forward crop types, control strategies and superior conversion technologies (e.g. gasification and integration with fuel line generators and gasoline cells) is vital for a sluggish advent of technically, economically and environmentally greater green Agri waste energy technologies.

Finally, there's want for extra awareness. Governments want to set up Agri waste primarily based totally enterprise and stake holder boards to pick out the possibilities and desires of the

enterprise, outline goals associated with studies, improvement, demonstration and implementation, speak obstacles to marketplace uptake and coverage measures geared toward overcoming them. The results of such boards then want to be translated into movement plans.

Therefore, the assist of decentralized Agri waste primarily based totally energy flora could be very critical. An suitable technique can correctly be carried out in cluster of 30-forty villages in Punjab, Haryana, Uttaranchal, Uttar Pradesh, Himachal Pradesh, Rajasthan and plains of Jammu & Kashmir. Farmers can deliver the Agri residue which can be accumulated at approximately 5 to seven centers for every of those flora. The Agri residue so accumulated can be briquetted, pelletized, shredded or bailed via way of means of branch and saved at 4 to 5 web websites apart from the plant web website online. This method of series will take approximately to 4 months. The requirement of approximately months can be stored at energy residence and the stability amount can be stored at different centres to keep away from hearthplace risk and the motion of gasoline can be performed from there to the web website online that allows you to refill the amount used.

Conclusion

Currently to be had records and information from research carried out heretofore suggest that inside a decade or so, it'd be cost-powerful to generate and deliver strength from renewable reassets upto heaps of megawatts because of persisted development in renewable strength gadgets searching for to growth performance and decrease cost. Besides augmenting the grid energy deliver, the renewable strength structures provide feasibility of decentralized energy technology at or close to the factors of use, that may lessen peaking hundreds and shop on high-priced up-gradation and preservation of transmission and distribution networks at the same time as serving the developing call for.

Agri waste primarily based totally structures are the best strength producing system, that have the blended blessings of renewability, decentralization and availability on call for without want for separate storage. Taking under consideration the strength necessities and economics of collection, processing and conversion to the desired shape, Agri waste aid appears to guarantee a vivid destiny from sustainability and conservation factors of view.

A really apt coupling of strength manufacturing programme with deliberate Agri waste manufacturing might be one of the few ability alternatives with splendid economic, environmental and social blessings. This near linkage presents the considered necessary monetary cause for plantation sports to be commercially successful. A ability employment era application for highly weaker sections of the society also can be installed function via such projects. Agri waste for electricity era has already been identified as an crucial aspect of the renewable strength programme in India and that is meditated in precedence given to it with the aid of using the Ministry of Non-traditional Energy Resources (MNES).

The new projects in country wide strength coverage are maximum urgently had to boost up the social and monetary improvement of the agricultural regions. It needs a huge growth in manufacturing and intake of strength for effective purposes. Such projects are crucial for selling the desires of sustainability, cleanser manufacturing and discount of long-time period dangers of environmental pollutants and consequent unfavourable climatic adjustments in destiny.

Finally, there's a shimmering promise that the complete procedure of harvesting, collection, shipping and monetary processing and usage of Agri waste may be made technically and economically extra feasible in destiny. Thus, the foregoing paras amply spotlight the price of agriresidue as a potential supply of electrical electricity, in particular for supplementing the principle grid all through the tilt deliver intervals or height load hours and additionally for serving the far off regions withinside the shape of stand on my own units. Its monetary viability appears to be high quality in view of its ability contribution to our monetary and social improvement. This initiative desires to be subsidized and pursued vigorously for eliminating nearby imbalances in addition to strengthening the National economy.

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