EMERGING TECHNOLOGIES FOR BETTER UTILIZATION OF BAGASSE.

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STEAM % CANE

- In Pakistan many sugar mills are achieving steam% cane of 40-44%.
- Elsewhere in the world this figure is 36-38%. The technology is same except for the use of continuous vertical pans, in some mills.
- I am sure Pakistan mills will start achieving this figure very soon.

POTENTIAL OF SURPLUS BAGASSE

- Now, if we take 2 Tons steam per ton of Bagasse and total Bagasse as 28-32% cane.
- The potential of surplus Bagasse comes to about 10% on cane.
- In other words, surplus Bagasse will be equal to the sugar produced.

USES OF SURPLUS BAGASSE

- The surplus Bagasse is already becoming a decent revenue stream for the sugar mills.
- Some mills are using it, while others are planning to use it for cogeneration.
- Some sell it as it is, which is mainly used as fuel.
- A small part also used for making particle board or card board.

NEW TECHNOLOGIES WILL USE BAGASSE AS RAW MATERIAL INSTEAD OF BURNING

- In short our plans for use of surplus Bagasse are mostly related to burning it.

- New Technologies are developing so that this situation may not remain the same in future.

COMPONENTS OF BAGASSE

- Washed and dried Bagasse has following components.

  - Fiber.
    - Cellulose 45-55%
    - Hemicellulose 20-25%
  - Lignin. 18-24%
  - Ash 1-4%
  - Waxes < 1%

MAKING ETHANOL FROM FIBROUS MATERIAL

- Making Ethanol from Fibrous material or biomass is now a standard process. It is called Cellulosic Ethanol or Second Generation Ethanol or 2G Ethanol.

- It was started in USA by using Corn as feed stock, but after the food vs energy debate remaining part of the plant after obtaining corn is being used.

ALREADY MAKING ETHANOL FROM BIOMASS

- In China (Anhui Province) a new plant for making cellulosic Ethanol is coming this year.It will process about 1 million tons of agriculture residue.

  (ISJ Year Book 2016).
- In Philippines a Dutch Company Van kessel is establishing a new Ethanol plant. The feed stock will be sweet potatoes, cassava, sweet sorghum, and coconut.
- (ISJ Year Book 2016).

VARIOUS PROCESSES TO BREAK THE FIBER INTO SUGARS

- Various processes are available to break the fiber in to sugars which can be fermented.

- The following are more important.
  - Acid Hydrolysis.
  - Bio Hydrolysis.
  - Hydrolysis by using Steam alone under high pressure.

BAGASSES

- However, there was no beak through to convert Bagasse in to Ethanol probably due to large proportion of Lignin.

CALORIFIC VALUES OF DIFFERENT COMPONENTS OF BAGASSE

- Lignin is a valuable material if we look at the calorific values of various components of the Bagasse.

• Cellulose	45-55%	17MJ/Kg
• Hemicellulose	20-25%	16MJ/Kg
• Lignin.	18-24%	21MJ/kg

NEW PROCESS FOR CELLULOSIC ETHANOL FROM BAGASSE

- Now a new process has been developed in which lignin part is separated before the fiber part is disintegrated in to sugars (though enzymes).
- The Lignin is either returned to the boilers for burning or can be converted to green coal.
- Sugars are converted to Ethanol through normal fermentation.

BIODIESEL FROM BAGASSE

- In another process, It is being claimed that Fiber can be directly converted to Bio diesel by a Pyrolysis type process.

MILL ALREADY MAKING ETHANOL FROM BAGASSE

- Two sugar mills inBrazil, GRANBIO and RAIZEN are already making Cellulosic Ethanol from Bagasse.

  (ISSCT co-product workshop 2015,Mauritius)

GRANBIO

- GranBio is words largest-known second generation cellulosic ethanol project. It has capacity to produce 82 million liters of Ethanol per year. The project has started production in September 2014.It uses Bagasse and straw as raw material.

RAIZEN

- Raizen is another plant in Brazil producing cellulosic Ethanol from Bagasse.It has capacity of producing 40 million liters of 2G Ethanol per year. Plant is in operation since late 2014.

- In this plant Lignin is being separated and returned to the boiler.

SUPER SWEET SORGHUM

- A mega project under the "Renewable Developments Australia Pty Ltd " is coming in Australia. This project has many features. Making Alcohol from Bagasse is part of this project. Growing and making sugar out of super sweet sorghum is also part of this project.
- Its Financial closure has taken place .
- Therefore, it is clear that it is in its implementation stage.

TECHNOLOGY

- Technology is costly and a well-guarded secret at this time.
- However, cheaper alternatives may be available soon.
- Praj India is setting up a prototype plant this year.

SIGNIFICANCE FOR PAKISTAN

- There is special significance of this process for Pakistan where distilleries have to stop due to shortage of Molasses.

- It looks like that distilleries will have to add only the pretreatment section, the rest of the distillery will remain the same.

Thank you