PRESERVATION OF QUALITY AND RESOURCE RECOVERY THROUGH IMPROVED LACTIC ACID FERMENTATION DURING BAGASSE STORAGE

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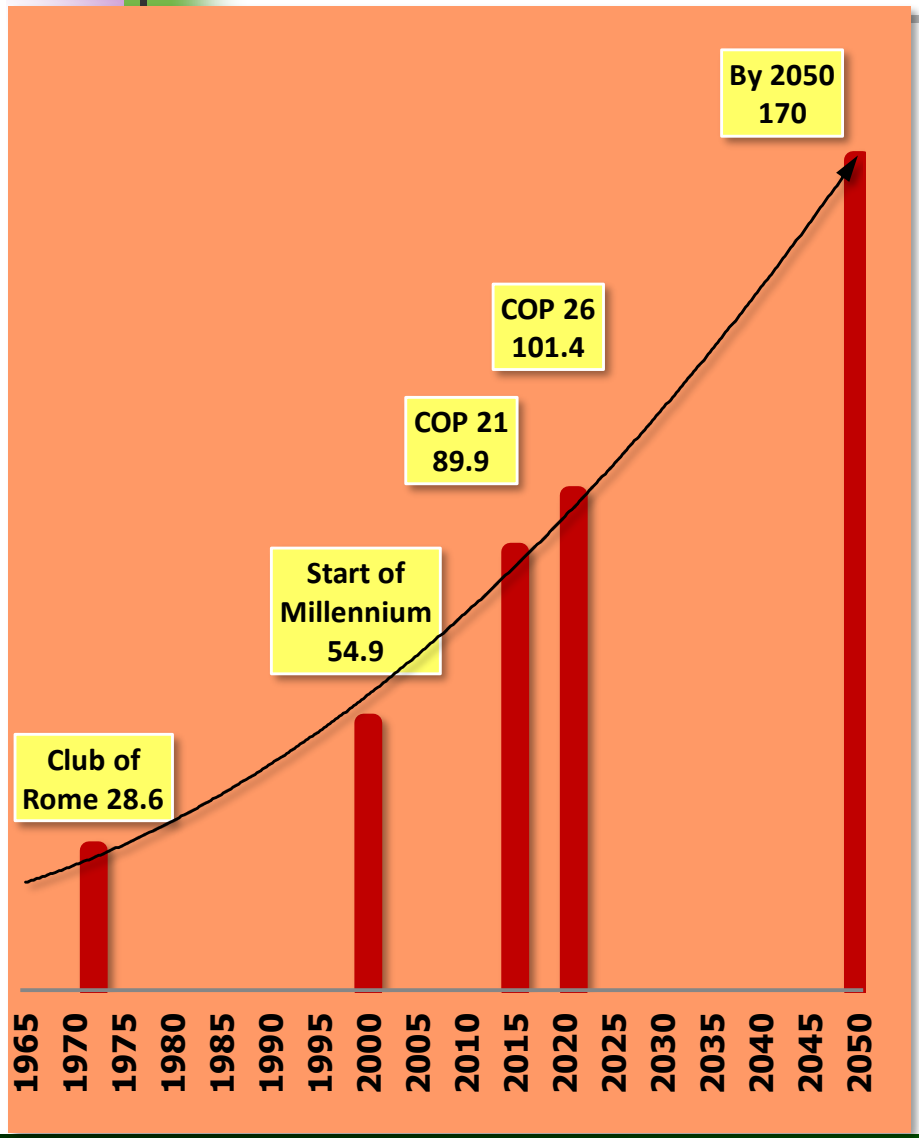
Preservation of Quality and Resource Recovery through Improved Lactic Acid Fermentation During Bagasse Storage

1. ***Preamble***
2. ***Present Study***
   - ***Resource Saving & Quality***
   - ***Waste to Value & CO_2 Emission Reduction***

Material Extraction (Gt) from 1972-2021 and Projected to 2050



In 50 years, global use of materials has nearly quadrupled—outpacing population growth.

In 1972, as the Club of Rome's report "Limits to Growth" was published, the world consumed 28.6 Gt.

By 2000, this had gone up to 54.9 Gt. In 2019, it surpassed 100 Gt and expected to cross 170 Gt by 2050

Rising waste levels are accompanying the rapid acceleration of consumption: ultimately, over 90% of all materials extracted and used are wasted.

Only 8.6% make it back into our economy. This rate of extraction continues to threaten the planet's future and our lives.

8 billion of us use 1.5+ times of the resources the planet can provide and absorb our waste.

This means, now the Earth need one year and six months to regenerate what we use in a year.

Unfortunately, there are more people living inside the circle than outside and making it still hard for the countries inside the circle, such as, India

We are the first people to breath the air with more then 420 ppm of CO_2. This mean CO_2 in the atmosphere has crossed 420 ppm and continue to increase and may lead to climate catastrophe.

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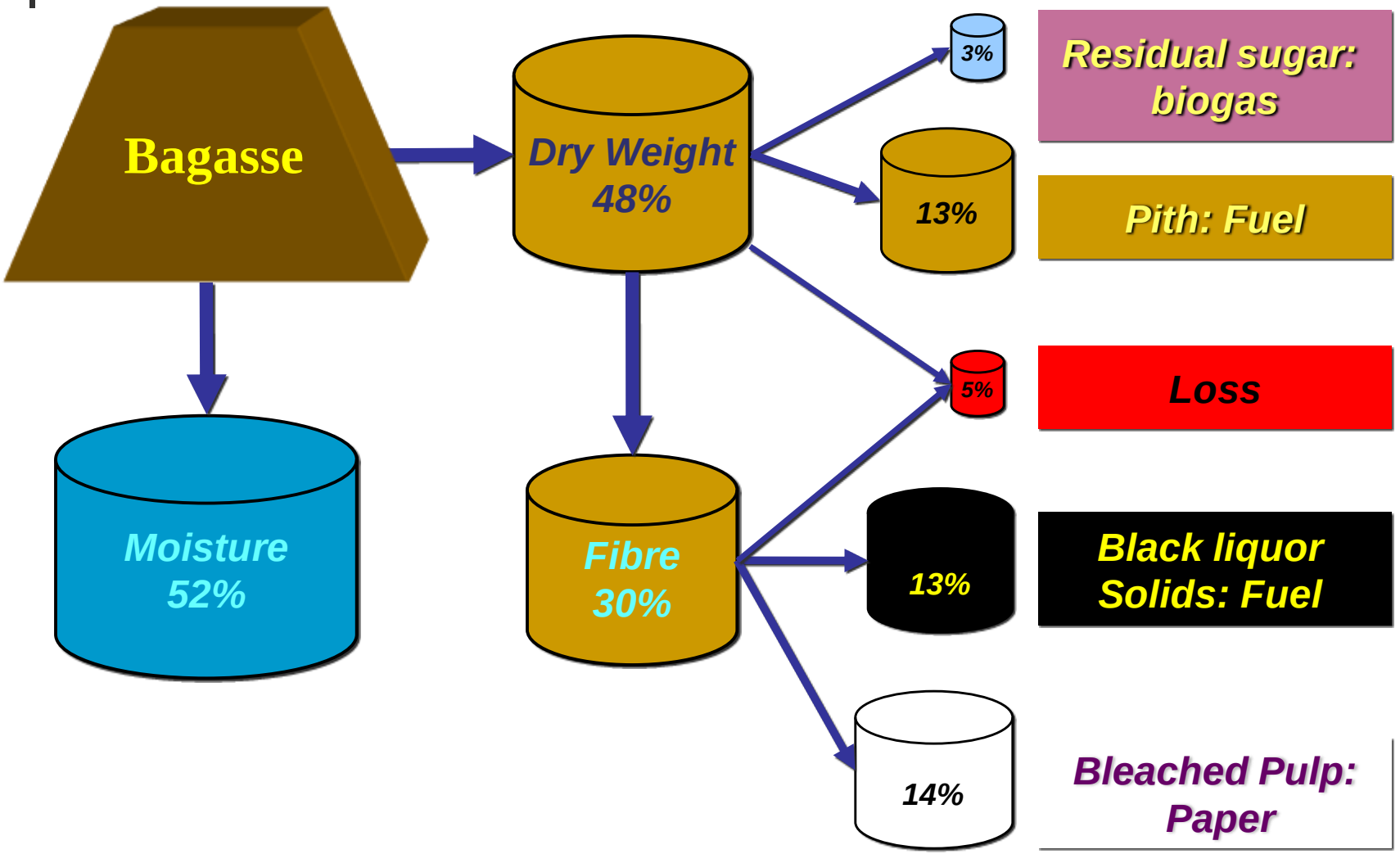
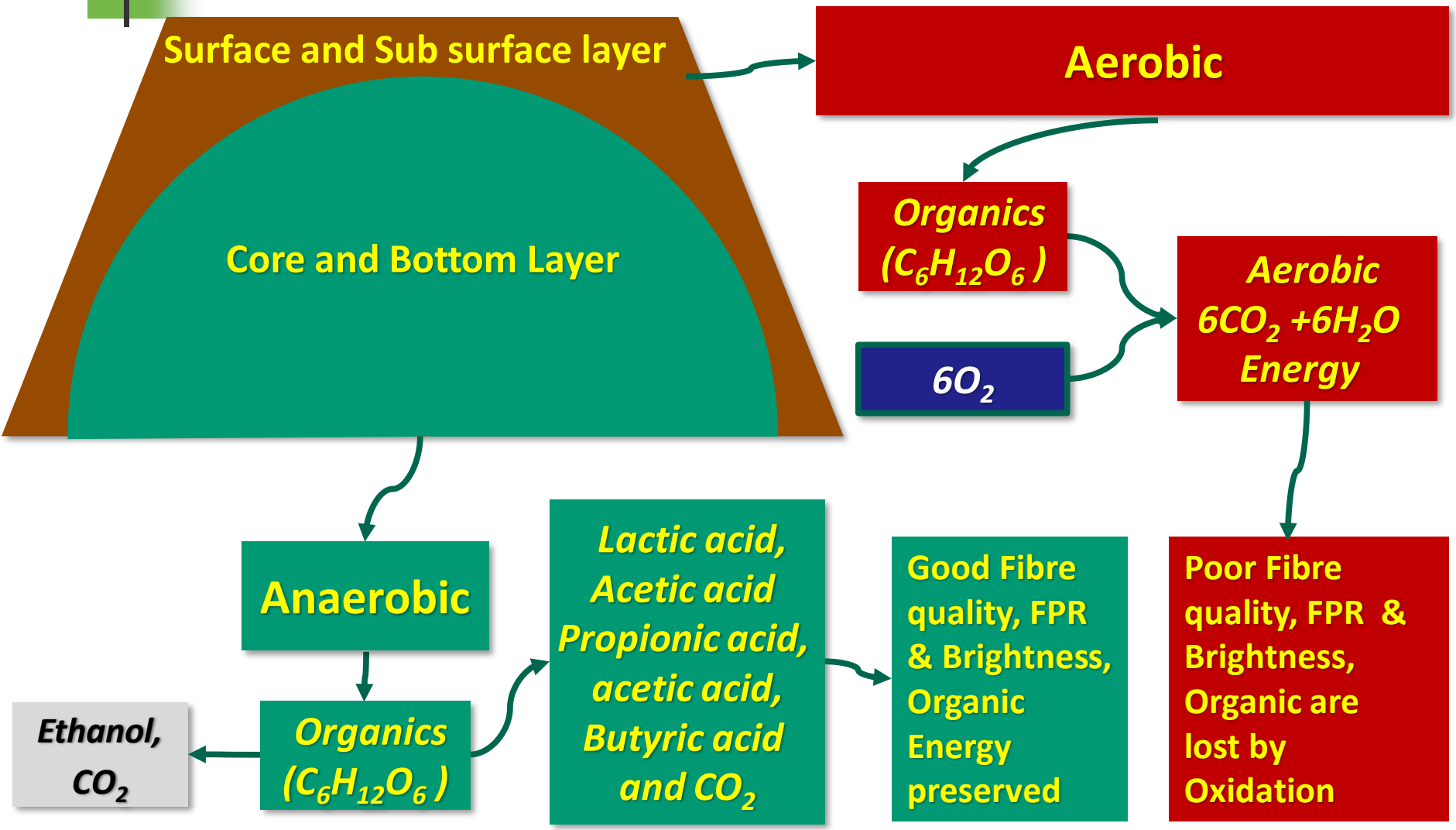
Bagasse: Wet Bulk Storage System

Bagasse Utilization in Paper Making Process



Bagasse: Wet-bulk Storage System



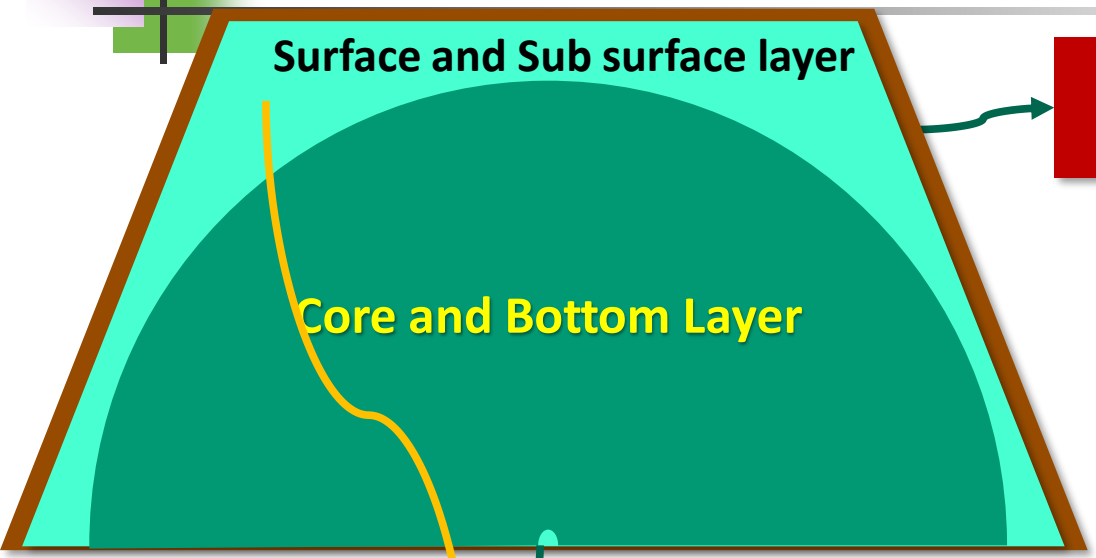
WBS System


WBS System


Water Sprinkling
Water Sprinkling


Water Sprinkling

Bagasse Wet-bulk Storage System: With Water Sprinkling



Aerobic

Organics ($C_6H_{12}O_6$)

$6O_2$

Aerobic $6CO_2 + 6H_2O$ *Energy*

Anaerobic

Organics ($C_6H_{12}O_6$)

Ethanol, CO_2

Lactic acid, Acetic acid Propionic acid, acetic acid, Butyric acid and CO_2

Good Fibre quality, FPR & Brightness, Organic Energy preserved

Poor Fibre quality, FPR & Brightness, Organic are lost by Oxidation

Impact of water sprinkling on bagasse quality during storage

S. No	Period	Without water sprinkling		With water sprinkling	
		Bright. %ISO	Fibre: Pith ratio	Bright. %ISO	Fibre: Pith ratio
1	Initial	38.6	2.15:1	38.6	2.15:1
2	Two months old	37.5		37.9	
3	Three months old	28.3		36.3	
4	Four months old	22.5		35.5	
5	Six months old	18	0.5:1	33.5	2.03:1

Impact of water sprinkling on bagasse pulp quality

S. No	Particulars	Without water sprinkling		With water sprinkling
		Sub-surface	Bottom	Sub-surface
1	Fibre:Pith ratio	0.5:1	2.31:1	2.03:1
2	Bagasse Brightness, %ISO	18	37.5	33.5
3	Total yield, %	41.1	55.7	54.7
4	Rejects, %	2.80	0.47	0.58
5	Kappa number	54.0	10.6	11.9
6	Brightness, %ISO	18.1	39.4	36.1
7	CSF, mL	500	450	440
8	Tensile index Nm/g	24.5	67.6	61.8
9	Tear index mNm^2/g	3.98	5.64	5.23
10	Burst index $kPam^2/g$	1.15	4.09	3.68

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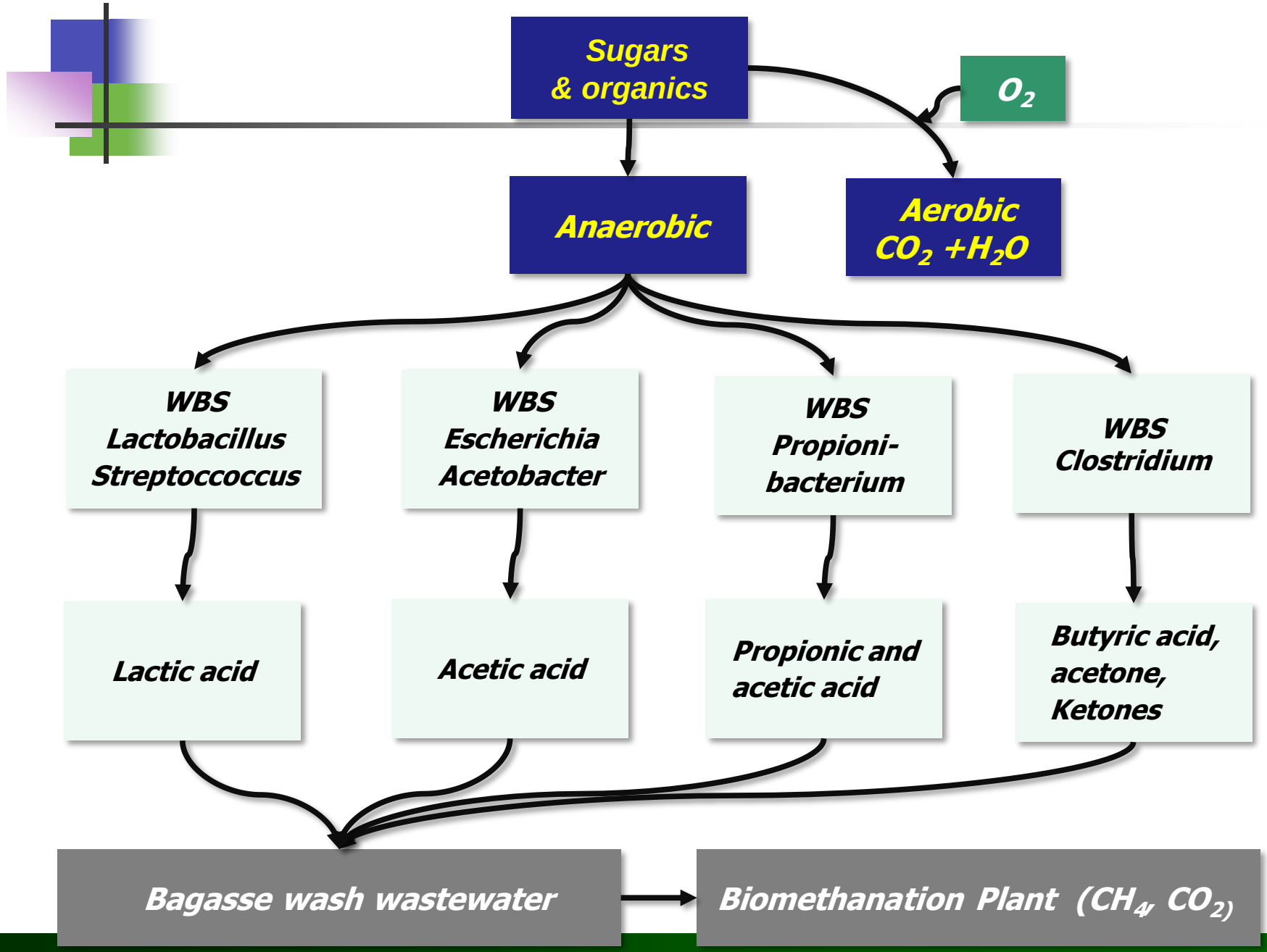
Sugars & organics
O_2
Anaerobic
Aerobic $CO_2 + H_2O$
WBS Lactobacillus Streptoccoccus
WBS Escherichia Acetobacter
WBS Propioni-bacterium
WBS Clostridium
Lactic acid
Acetic acid
Propionic and acetic acid
Butyric acid, acetone, Ketones
Bagasse wash wastewater
Biomethanation Plant (CH_4, CO_2)

Characteristics of wastewater from bagasse WBS yard

S. No	Parameters	Bagasse wash water	Central channel water
1	pH	4.6	3.9
2	VFA meq/L	48	112
3	Color Pt.-Co.	350	540
4	Total solids mg/L	5,283	10,400
5	TDS mg/L	4,283	9,560
6	TSS mg/L	1,000	840
7	COD soluble mg/L	3,651	15,400

Fuel saving and GHG reduction from biogas plant for the year 2021-22	
Biogas generation, m^3/year	95,67,079
Furnace oil saving, kL/year	5,740
Bagasse wash wastewater treated m^3/year	48,15,750
COD reduced, MT/year	18,261
GHG Emission reduction, MT CO_2eq	18,636

- *Current price of F. Oil is around RS 53,000/kL*

Water Sprinkling

Good Compaction Reduced Aerobisity, pH and Aerobic Oxidation

Fibre

- Bagasse: High FPR value & Brightness : high quality
- Pulp: High yield, Strength, Optical Properties, Resource Efficiency & Cost and Improved Quality.
- Environment: Reduced Chemical Consumption: Less Pollution, Cost and Resource Saving

Organic Residues

- Avoids Oxidation & Conversion of organics to organic acids: Saving of Biogenic Resources
- Organic Acids to Biogas: Renewable Energy Generation, F. oil & Cost Saving and Reduced GHG emission and Climate Change

Thanking you


Questions
Answers