



German Engineering, Local manufacturing *

Heat Transfer Plate Technologies in Bioethanol Plants Built to last (Sugar, Refinery , Distilleries & Fertilizer)

Save Energy and Water

VIRENDRA JHAMB

Clean Earth Energy Solutions India Pvt Ltd



An outstanding mission and courage from Govt of India to achieve the Environmental goals through massive Bioethanol plants

BUT !

MITIGATE THE PROBLEMS IN PROCESS LINES AND ENJOY THE PROFITABLE VALUE CHAIN

- Security of the availability of the grain. (govt should promise). GMC with 30% less carbon content compared to gasoline. Regulatory issues can be addressed through scientific & Management solution and not public disoriented approach. USA has removed the obstacles in using GMC (Sept 24 onwards) ; USA is aiming to export bioethanol to world as they have more arable land. They can.
- More than 50% of plants are consuming more than specified steam consumption at rated capacity of the bioethanol plant. Fluctuations are beyond 10%. Owners must control it. CEES can help you. Already proven at Triveni, Radico, Ankur Biochem, CDBL (all plants) and now PAPL underway. Energy cost is almost 30% of the total production cost. Price of the grain is not the only matter.
- Water utilization can be planned to be < 2.5 liters per liter production of ethanol. Which in the cases of the corn slurry-based plants is jumping to 4.2 ~4.5 liters. (at Renuka 2 plants of 350 KLPD ; it is 1.8 liters (VSI) [CEES has demonstrated the same and payback period was less than 9 months]

WHO'S WHO OF ETHANOL MARKET ARE OUR ESTEEMED CUSTOMERS



Athani, Munoli,
Havelga, Mundra



CDBL, Haryana, BDBL, Alcograin

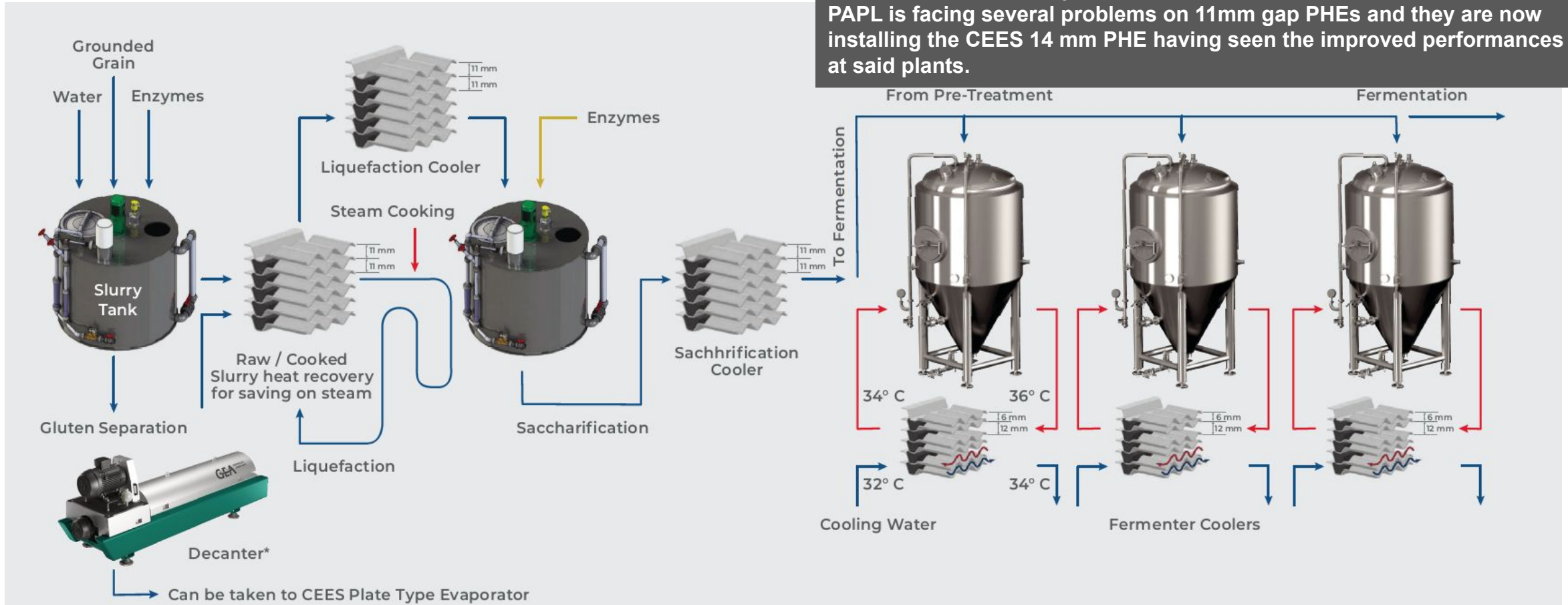


Pioneer Industries Pvt. Ltd



GRAIN TO ETHANOL- STEP1

11 mm gap is fine for rice slurry but for Corn slurry fibres 14mm gaps are must and specifications are still mentioning 11mm. Share the experiences Radico Khaitan , Ankur Biochem, CDBL (All plants owners , Unit Heads can share their experience with comparison demonstrated in these plant sites. PAPL is facing several problems on 11mm gap PHEs and they are now installing the CEES 14 mm PHE having seen the improved performances at said plants.

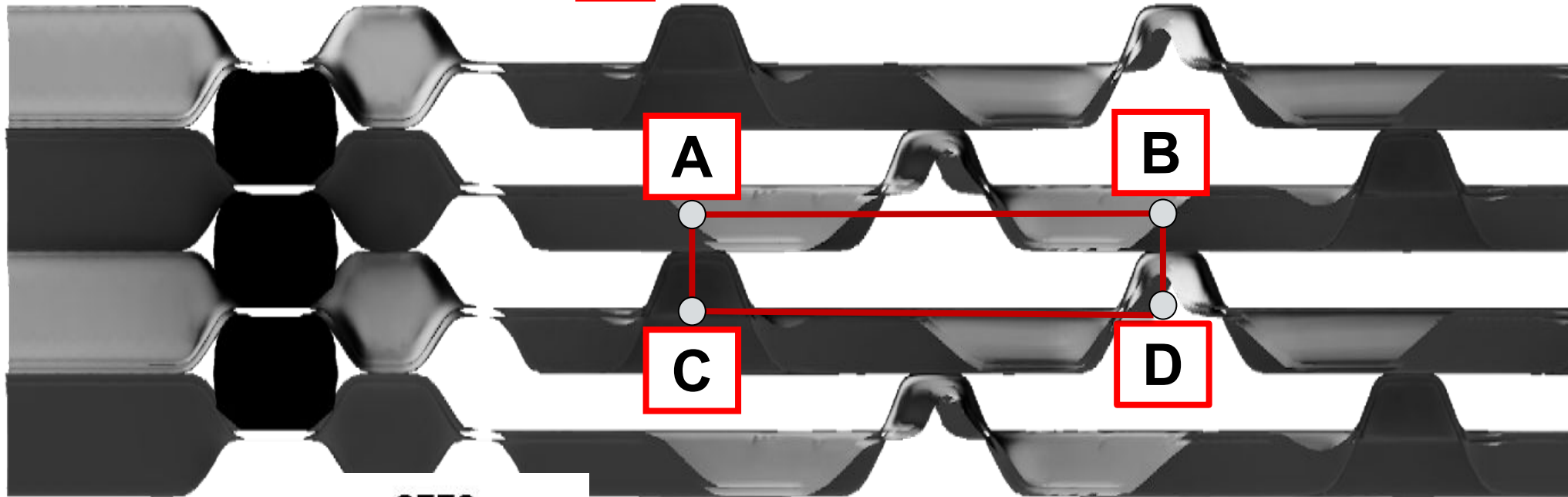


400 KLPD means 160 m3/Hr cooking of grain slurry means around 12 T/hr steam

**WIDE GAP
PLATES ARE
ARRANGED IN
THE PHE.**

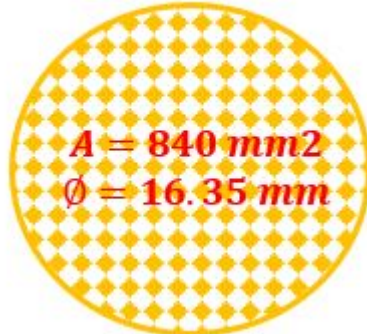


CEES FREE FLOW WIDEST PHE MAKES THE DIFFERENCE



CEES

CEES INDIA
 $A = AB * AC$
 $A = 60 * 14$
 $A = 840 \text{ mm}^2$



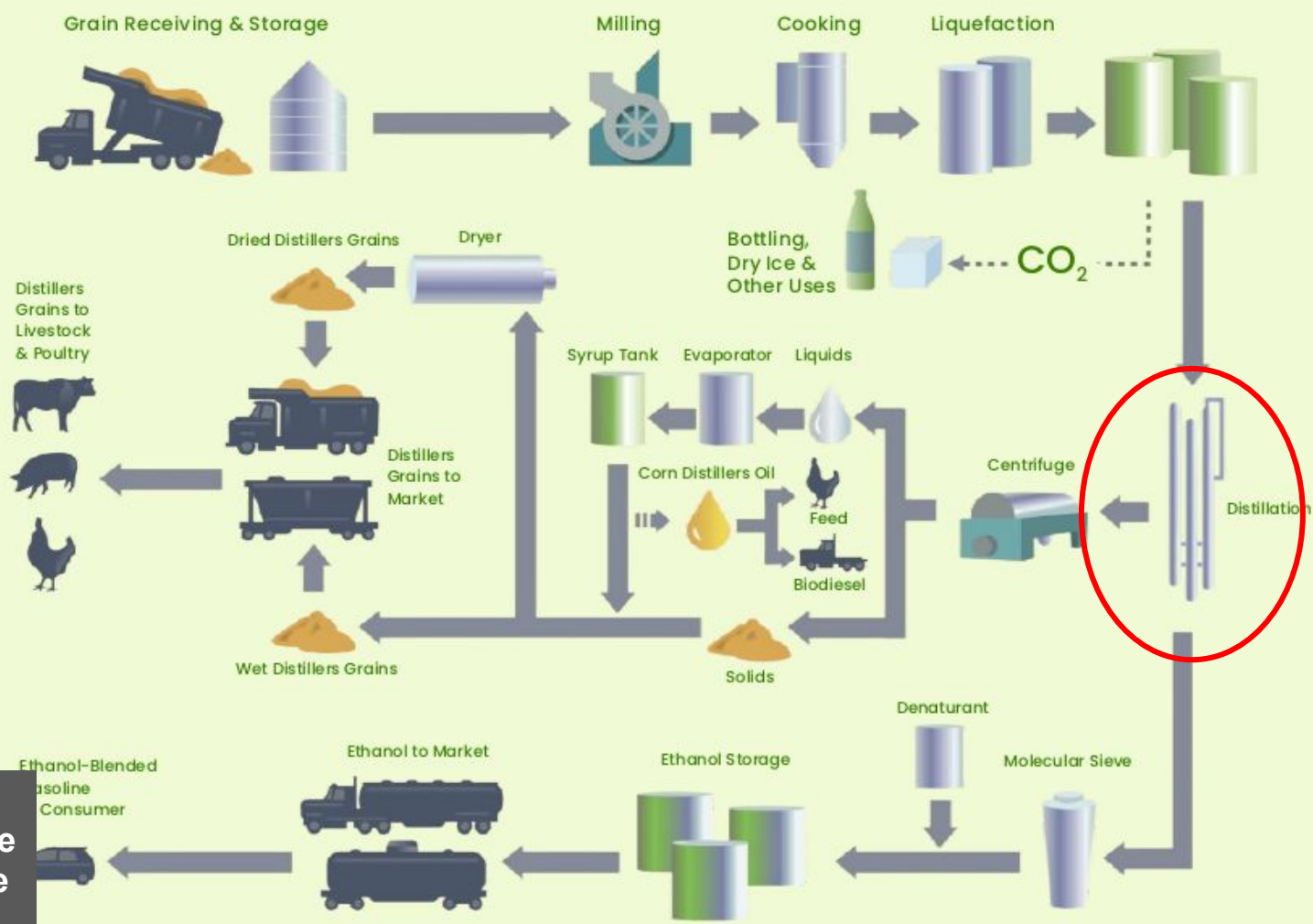
COMPETITION
 $A = AB * AC$
 $A = 45 * 11$
 $A = 495 \text{ mm}^2$



**THIS MAKES CEES WIDE GAP PHES WORKING FOR LONGER PERIOD
 ULTIMATELY HIGHER PRODUCTIVITY & LESSER STEAM UTILIZATION.**

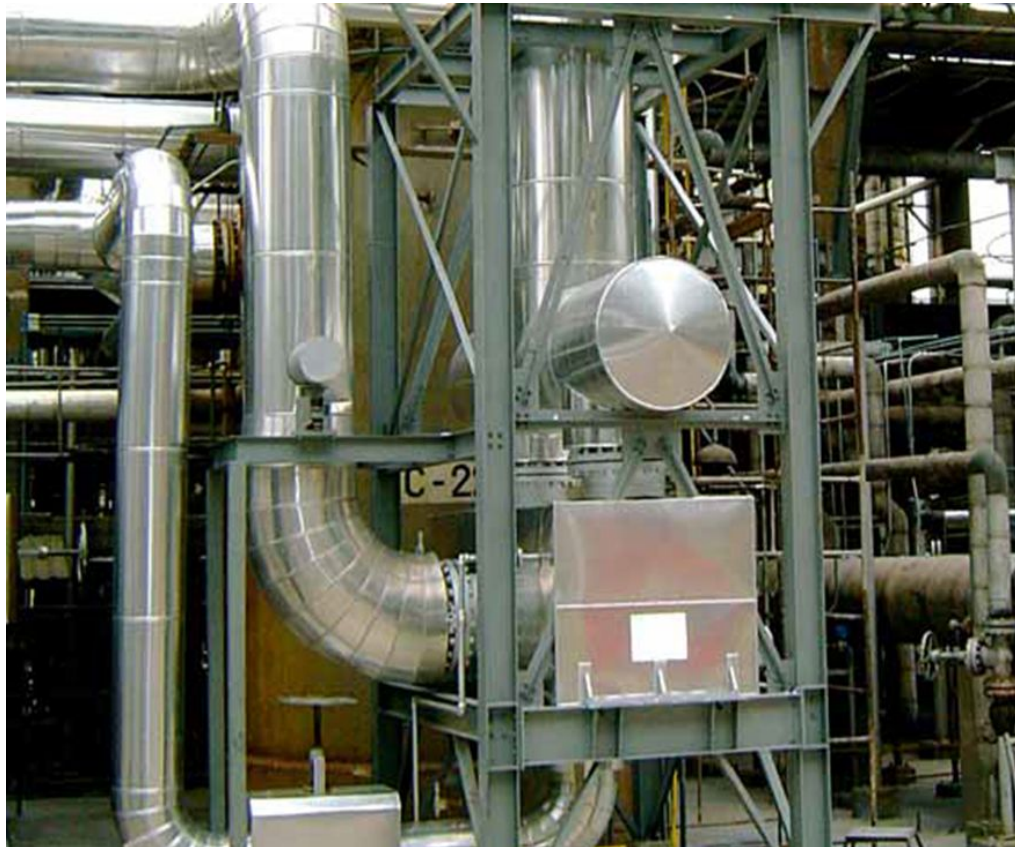
GRAIN TO ETHANOL-FULL PROCESS LINE IN SUMMARY-STEP 2

The bioethanol production process involves several steps, & CEES's products play a crucial role in optimising efficiency & water management.

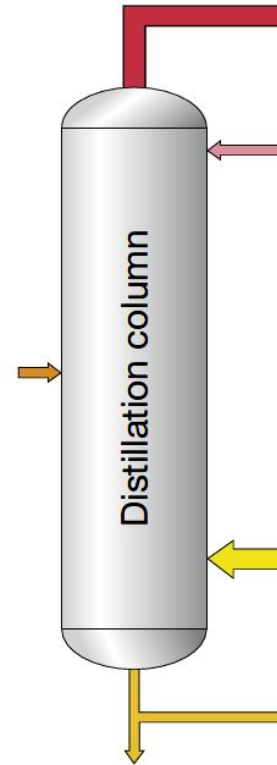


Specify the vapor possibility at 127 C (1.31 barg instead of live steam at 3.32 barg. A huge saving is being achieved by Renuka plants. Please share with Renuka Manoli and Athani plants.

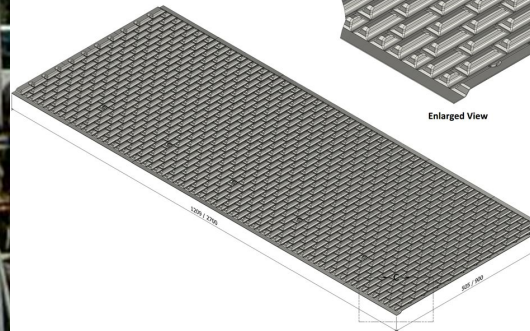
DISTILLATION COLUMN CAPEX & OPEX BOTH CAN BE REDUCED (LOOK AT THE INSTALLED) REBOILER)



CEES Air cooled Alcohol vapor condenser



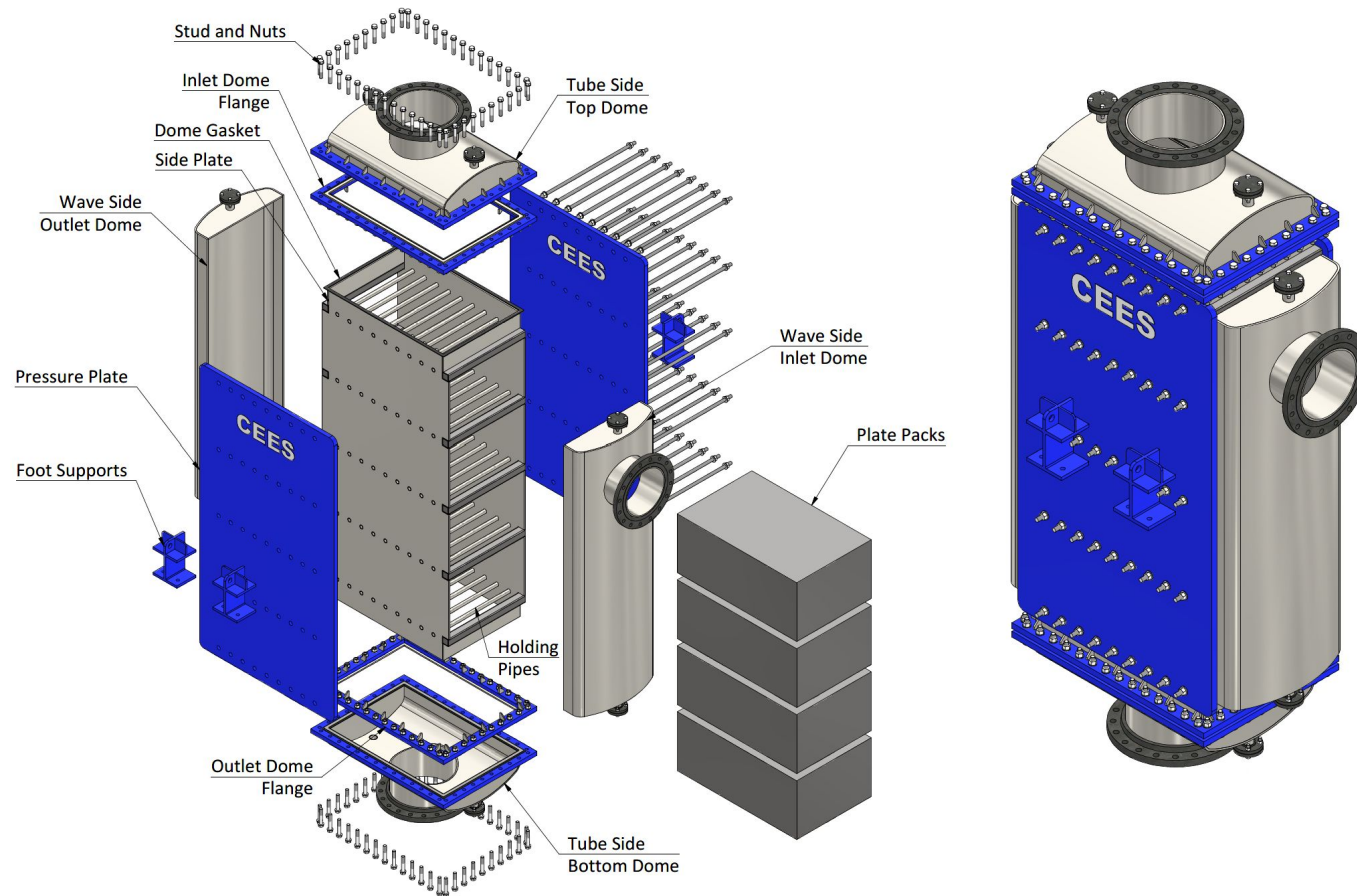
Enlarged View



CEES Hybrid Reboiler

Model	Width MM	Length S MM	Length M MM	Length L MM
CH5	500	777	993	1209
CH9	900	945	1800	2700

CEES HYBRID REBOILER/ FFE/CONDENSER FULLY OPENABLE



TUBE SIDE : TUBE STRUCTURE OF 10MM DIA
 PLATE SIDE : CORRUGATED PLATE CONSTRUCTION OF 5MM GAP

REBOILERS WITH CEES HYBRID PLATES ON DISTILLATION COLUMNS : INSIST ON 127 C VAPOR TO BE USED INSTEAD OF THE OLD CONCEPT OF LIVE STEAM OF 145 C.

**AN EXAMPLE ON THE REBOILER (RC COLUMN) ADVANTAGE THROUGH HYBRID OVER S&T
(SAME OR LOWER CAPEX WHILE OPEX TOO IS REDUCED SO SIGNIFICANTLY)**

S&T			Hybrid CEES				
	Spent Lees	Units	Steam		Spent Lees	Units	Steam
Flow rate	295078Kgs/Hr		30000		295078Kgs/Hr		29299.74
Inlet temp	125.5°C		147*		125.5°C		130*
Outlet temp	125.4°C		147		125.4°C		130
Heat load	15214740Kcal /Hr		15214740		15214740Kcal /Hr		15214740
HTA	1100m2				750m2		
Pressure drop	50Kpa		8.00		50 KPa		9.80
* 4.34 bar					* 2.68 bar		

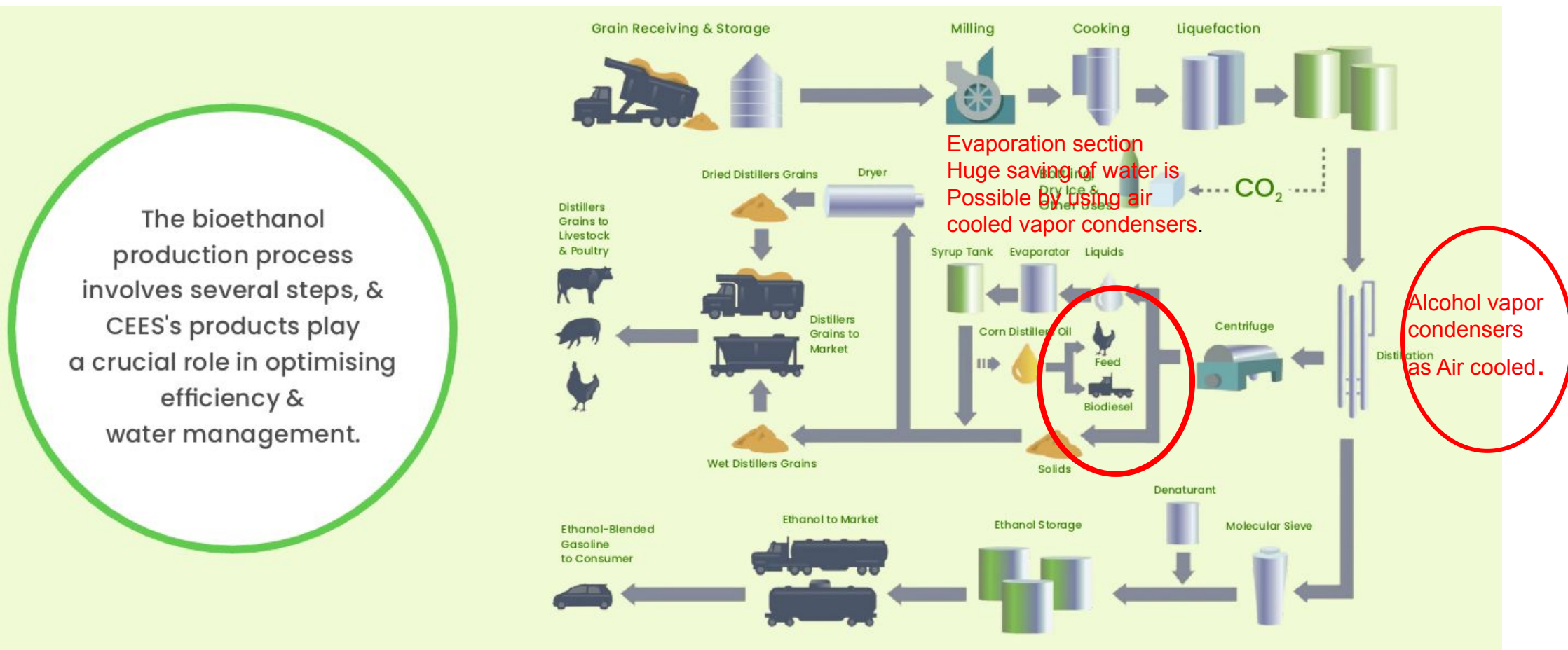
Comparison of Power Generation at Different Back-pressures

Basis Steam turbine operating with different back pressures

Steam parameters					
Inlet			Outlet		
			Case 1		Case 2
Flow (Q)	70,000.00	kgs/hr	70,000.00	kgs/hr	70,000.00
Pressure	65.30	kg/cm2 a	5.39	kg/cm2 a	2.90
	64.04	bar a	5.29	bar a	2.84
Temp	480.00	deg C	202.80	deg C	137.00
Enthalpy(h1)	3,370.10	kJ/kg	2,860.43	kJ/kg	2,734.21
	804.93	kcal/kg	683.20	kcal/kg	653.05
Turbine eff	0.98				
Generator eff	0.98				
Power generation in Kwh	= Q*(H1-H2)/859.85				
Theoretical Power generation	Kwh		9910		12365
	Mwh		9.91		12.36
Actual Power generation	Mwh		9.52		11.87
Additional power generation	Mwh				2.36
Extra gain					
Elctricity Cost		Rs/kwh			5.00
Amount for 300 days (in INR)	300	days			8,48,60,312.03

**SAVINGS
CALCULATION FOR
GBL IS ATTACHED IN
THE TABLE.**

GRAIN TO ETHANOL-FULL PROCESS LINE IN SUMMARY-STEP 3



The bioethanol production process involves several steps, & CEES's products play a crucial role in optimising efficiency & water management.

Proven at various Ethanol plants and Refineries. Share the experiences with Mr. Ramesh ji at Renuka for many plants at Renuka and Wilmar,, Indonesia Mr. Asif Iqbal at Asif Iqbal and Mr. Awasthi at Diftech.

AIR COOLER ALCOHOL – 2*350 KLPD RENUKA , MUNOLI ETHANOL PLANT

Distillation Section						MEE Section
CEES DESIGN DETAILS	HE-411 A/B Analyser Column Condenser	HE-401 A/B Degasser Column Condenser	HE-420A/B RC Column Condenser	HE-430 Recovery Column Condenser	HE-505 A/B Molecular Sieve Condenser	Air cooled Surface Condenser
Medium (vapours)	50% Alcohol + 50% Water	50% Alcohol + 50% Water	95.5% Alcohol + 4.5% Water	94% Alcohol + 6% Water	99.8% Alcohol + 0.2% Water	Water Vapor
Inlet Flow Rate Kg/hr(hot side)	4000	2000	15000	12000	15000	30000
Inlet Temp. °C (Hot side)	71.13	68.39	103.13	81.16	76.12	54.91
Outlet Temp. °C (Hot side)	61.51	58.82	103.13	81.15	76.12	54.91
Pressure, Bar(A)	0.45	0.40	2.50	1.15	0.95	0.16
Heat Load, kcal/hr (3,63,30,000) Distillation Section	15,55,000	7,80,000	30,14,000	26,11,000	29,90,000	1,70,41,000
Ambient Air Inlet °C (Max)	42	42	42	42	42	42
MOC of Tube - Welded Type	SS304	SS304	SS304	SS304	SS304	SS304
MOC of Fins	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium
Max/yearly Average power installed/ utilized (518 KW/300 KW)	21.32	11.01	21.04	21.32	29.01	331.41
Motor type	IE3/ Flame proof	IE3/ Flame proof	IE3/ Flame proof	IE3/ Flame proof	IE3/ Flame proof	IE3/Non-Flame proof
Fan blade material	PAG	PAG	PAG	PAG	PAG	PAG
Sound level	85 +-3 dB	85 +-3 dB	85 +-3 dB	85 +-3 dB	85 +-3 dB	85 +-3 dB
Layout	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Overall Dimensions	7000 (L) x 7000 (W) x 2200 (H)	7000 (L) x 3500 (W) x 2200 (H)	7000 (L) x 7000 (W) x 2200 (H)	7000 (L) x 7000 (W) x 2200 (H)	7000 (L) x 10500 (W) x 2200 (H)	50000 (L) x 20000 (W) x 2200 (H)

AIR COOLED ALCOHOL CONDENSER – 400 KL ETHANOL

OPEX COMPARISON

A: Freedom from water woes and associated Savings

1. Total heat Load of all 10 ACC in Kcal/hr = 3,63,30,000
2. Max temperature differential for wet cooling tower °C = 8
3. Hence flow rate of the pump : = 4500 m³/Hr.
4. Pump KW @ total head of 50 meter = 700 KW/hr
5. Cooling tower Fan power = 250 KW/hr

B: Power Consumption Average of ACC –Avg yearly consumption = 300 KW/Hr

C: So savings on Electrical consumption would be : $650 \times 315 \times 24 \times 5.00$: Approx. **2.45 crores/ Annum**

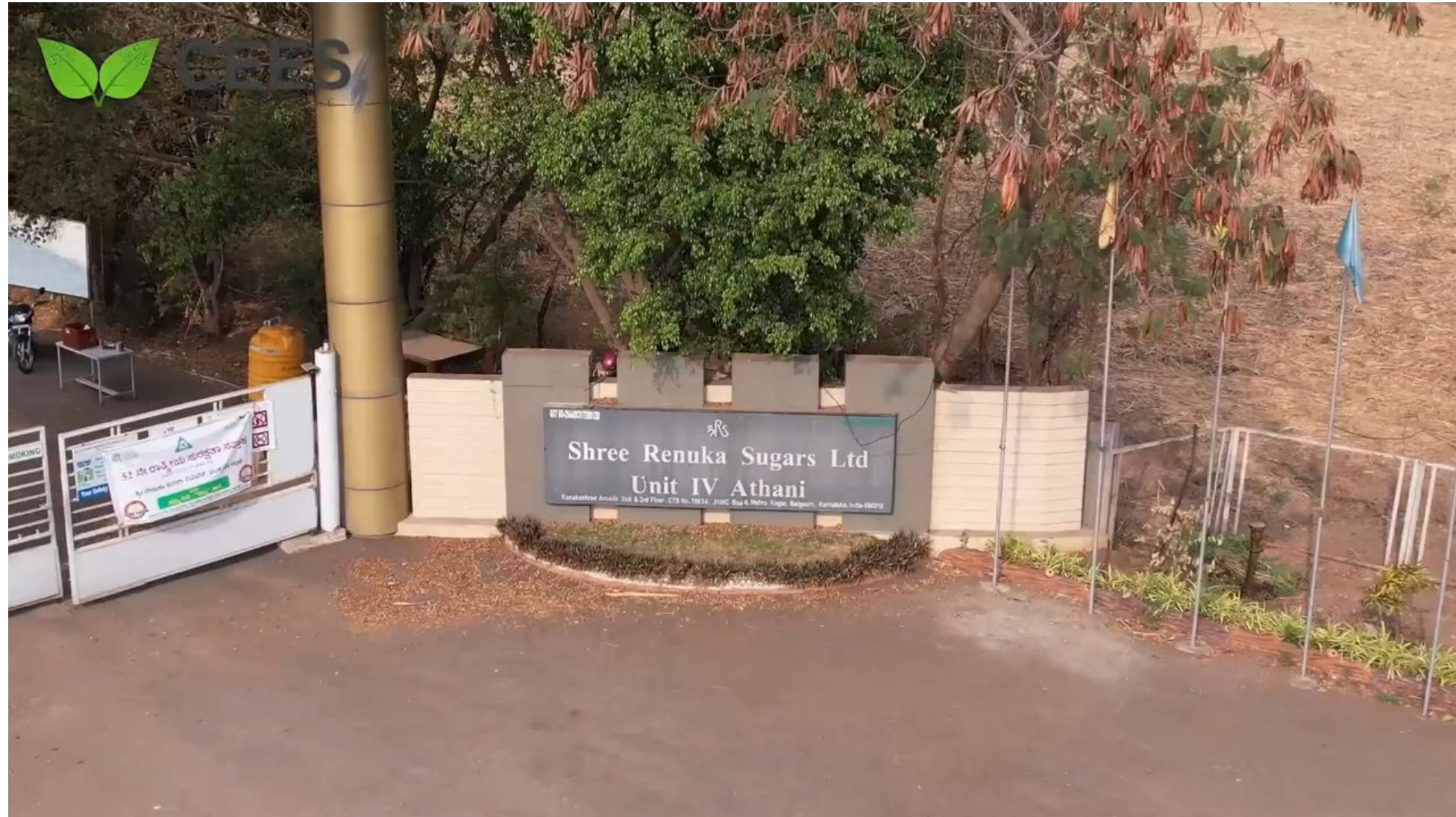
D: Chemical Cost of Water treatment + Evaporation loss : **7 crores per Annum**

E: Down time cost due to cleaning requirements of the system due to scaling /Deposition : **EXTRA**

CAPEX COMPARISION

ACC will cost around : 11.5 Crores. CTW with pumps for 4500 m³/Hr (including Civil costs) : 5.0 crores
Savings per year : around 9.45 crores

AT RENUKA.. SEE THE SAME.. WORKING SINCE LAST 3 YRS.



CONTACT DETAILS : LET US COMPLETE AND EXTEND

Share the opinion with	Designation
Mr. M. Prakash	Director Operation at Radico (earlier Triveni)
Mr. Mahendra Sharma	CMD at Ankur Biochem
Mr. Ramesh Saheb	Director Process at Renuka
Mr. Vikas Gupta	MD at PAPL

Thus CEES is joining the dots from fertilizer to Farmers to process plants and offering you the benefits with a promise of longer operations. And earning extra profit margins.

www.ceesindia.com