



# The Argument for On-Site Power Production at Ethanol Plants

Combined Heat & Power – Transforming Ethanol Plants' Profitability, Carbon Intensity, and Value

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# Agenda

- Why what we are presenting is important
- CHP – The Basics
- CHP's relevance to our markets
- What makes us better?
- A complete solution
- What are the benefits?
- What are the risks?
- Conclusions
- Questions/Discussions



# Why what we are presenting is important

## *Some Background*

1. When most ethanol plants were first constructed, the financial and energy markets were dramatically different from today's Markets
  - a. Electricity was generally cheap with abundant coal generation.
  - b. Ethanol plants typically had ZERO excess capital available when first built
  - c. Carbon intensity and carbon markets were not on an ethanol plant's "radar screen"



## Why what we are presenting is important

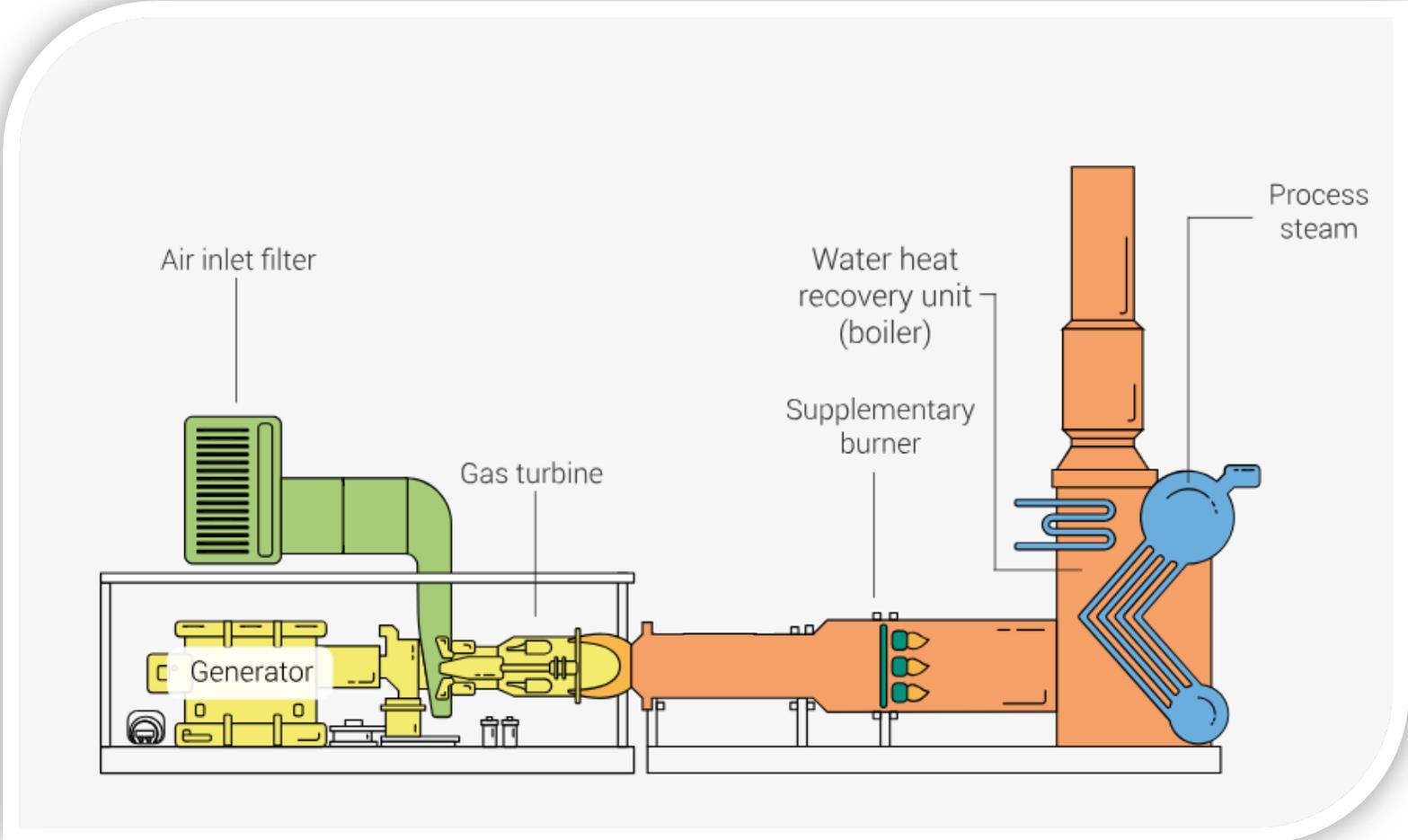
*So what's different*

1. Over the past decade many ethanol plants have experienced significant electric power rate increases
2. Gas turbine efficiencies have increased dramatically in the last ten years
3. Carbon markets are maturing and expanding rapidly
4. The importance of carbon intensity and the value opportunities they enable are significant
5. Uncertainty around grid power – Pricing (various capacity, demand and other charges), Unplanned Outages, and Security Issues
6. Natural gas is abundant, relatively inexpensive and should remain so for many years



# Combined Heat & Power

## *The Basics*



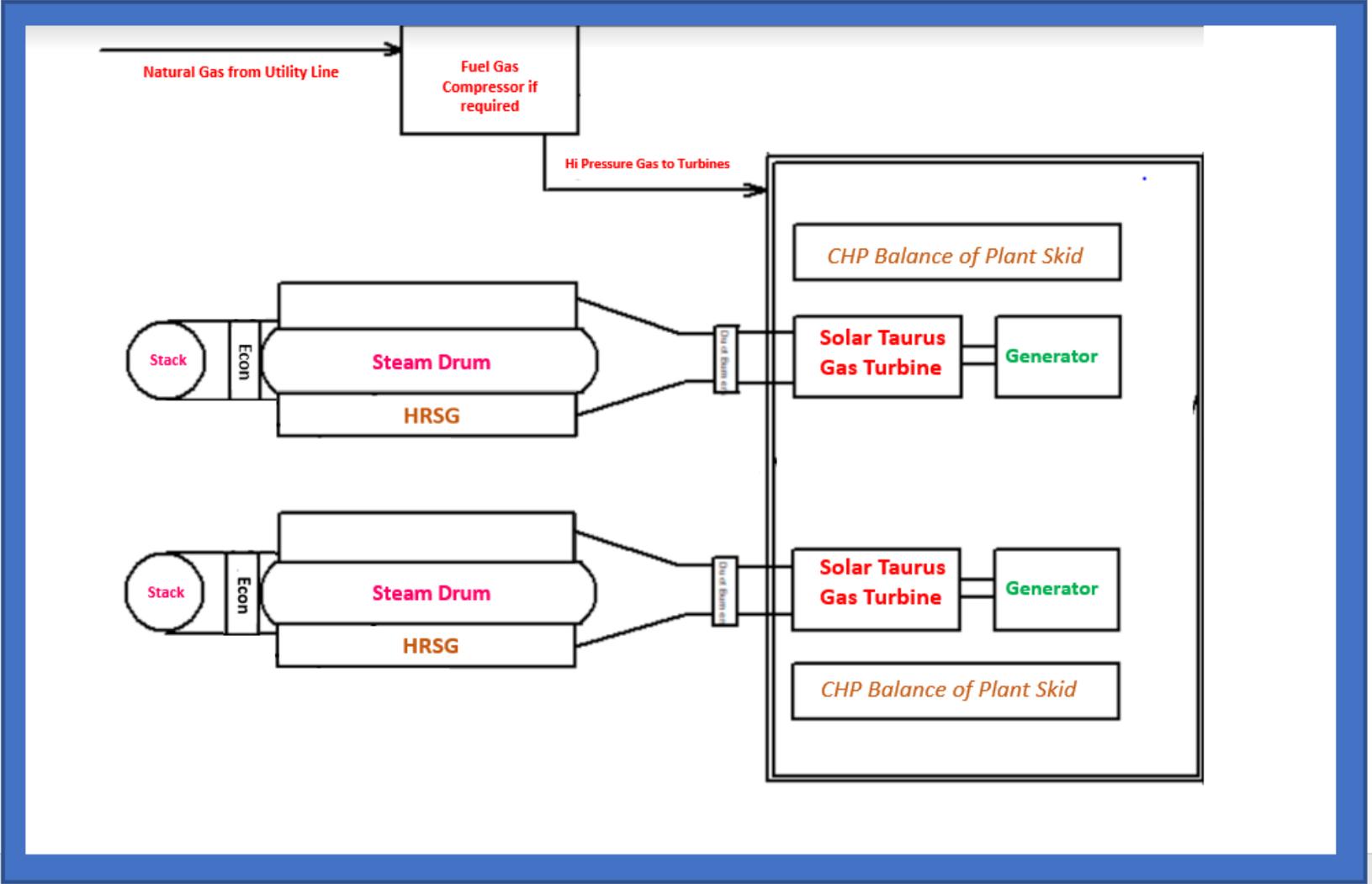


# Combined Heat & Power

## *Our Typical Configuration*

Site Dimensions:  
108 X 168 = 18,144 Ft<sup>2</sup>

Turbine Building  
Dimensions:  
88 X 70 = 6,160 Ft<sup>2</sup>





# CHP's Relevance to our Markets

- Of all of the available technologies – CHP generates the highest profitability over a 10 year period with *MINIMAL ASSOCIATED RISK*
- The energy savings and benefits of CHP are not tied to the uncertainties associated with the RFS
- Highly reliable, proven technology already creating value in many industries
  - Refining & Chemical
  - Power Generation
  - Pulp & Paper
  - Food & Beverage
  - Tire & Rubber
- Immediate and Direct Bottom Line Impact – starts the moment the CHP begins generating all your power & steam needs



# A complete solution

- Our solution includes finance, build, own, operate, and manage regulatory compliance
- 100% financing
- Off balance sheet financing/ownership options (does not impact the existing debt or equity position of the ethanol facility)
- Project executed by highly experienced engineering/construction partners
- Plant operations monitored 24/7/360
- Regulatory compliance for the CHP plant managed by experienced in-house resources



## What makes our project *better?*

- Sizing the turbines to replace your entire steam load results in maximizing energy savings and carbon reductions
- No irreversible plant process modifications (black box-free)
- Does not compete with other available technologies
- Enhances the efficiency of other available technologies
- Deep electricity market expertise & experience
- Highly experienced team
- *Only low risk/high return solution in the market that significantly reduces both energy cost & carbon footprint*



# CHP's Real World Financial Impact – Energy Savings

Plants	Plant Design/Size (Million Gallons per Year)	Current Energy Cost (\$_Million)	Energy Cost - Optimal CHP Design (\$_Million)	Energy Savings (\$_Million)	Energy Savings (\$0.00/Gallon)
Plant A	ICM 58	\$7.85M	\$5.5M	\$2.3M	\$0.040
Plant B	ICM 116	\$15.67M	\$10.97M	\$4.7M	\$0.041
Plant C	Delta T - 60	\$10.37M	\$5.64M	\$4.73M	\$0.079



# CHP's Real World Financial Impact – Potential Carbon Intensity Benefit

Carbon Intensity Reduction Calculations				Potential Top Line Revenue		
Plants	Carbon Intensity <sup>1</sup> before CHP	Carbon Intensity <sup>1</sup> after CHP	Difference - (gCO <sub>2</sub> e/MJ)	Cents/Gal @ \$120/MT	Cents/Gal @ \$160/MT	Cents/Gal @ \$187/MT <sup>2</sup>
Plant Top	82.91	67.91	15	\$0.36	\$0.48	<b>\$0.59</b>
Plant Middle	75.96	63.96	12	\$0.41	\$0.55	<b>\$0.68</b>
Plant Low	66.3	60.7	5.6	\$0.07	\$0.10	<b>\$0.75</b>

<sup>1</sup>Measured in gCO<sub>2</sub>e/MJ  
gCO<sub>2</sub>/MJ @ \$187.00/MT (LCFS Credit Market price - 8/6/2018)



# Benefits of CHP to the Ethanol Plant

1. Host ethanol plant becomes completely grid independent
  - a) Greater reliability – eliminates unplanned outages
  - b) Eliminates costly utility surcharges (Time of Use, Demand Charges, etc.)
  - c) Eliminates the possibility of cyber-hacking of the electric supply
2. Turbine/HRSG provides all of the process steam
  - a) Eliminates natural gas burn for process heating at the host plant
  - b) Higher thermal efficiency of the combined cycle process greatly improves CI scores
3. Mothball aging, less efficient boilers
  - a) Ends boiler maintenance expense
  - b) Eliminates costly boiler refurbishment/replacement
4. CHP's Heat Recovery Steam Generator (HRSG) can easily generate more steam for plant expansion without expensive additional boilers
5. Our CHP installation corrects some known safety issues with TO's and dryers
6. Final Analysis – Enhances the value of your shareholders' asset



# A Major Challenge to the Ethanol Plant Board is where to deploy your capital

1. Status Quo is not an option
2. Multiple technologies are vying for your capital
  1. TotalGen brings 100% financing for the project
  2. Obtaining single capital project financing for these other projects is challenging
3. TotalGen Approach:
  - 100% financing for the project
  - CHP projects have very little technology risk
  - Projects do not in any way lock you into our CHP technology at the host plant
  - Projects do not rely on any RFS-based revenue
  - Projects have good returns based solely on energy savings
  - Potential revenue from CHP carbon intensity reductions are all upside



# Conclusions

1. CHP is the quickest and most effective way to dramatically reduce energy costs by up to 40%
2. Off Balance Sheet Financing Available
3. CHP provides the highest, low risk returns over a 10 year period
4. CHP provides the highest carbon intensity reduction of currently available technologies
5. CHP will become the standard in the industry



# Questions & Discussion

Thank you very much!

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