# Clean Refineries, Inc.

**Net-Zero Emissions**
**Hydrocarbon Processing**


*Fundamentally Transforming Petroleum Refining*

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*Minimizing Environmental Impact and Footprint*

# Defining the Refining Problem

- 129 Refineries left in the U.S.; 30 in Texas
  - Majority of Texas capacity located on the Gulf Coast
  - Limited crude grade process flexibility forces an increase in U.S. crude exports (light, sweet)

- Aging Infrastructure / Declining Capacity *
  - Last sizeable refinery built 47 years ago

- Hostile permitting environment (EPA, using Clean Air Act)
  - Regional opportunity, but stifling environmental regulatory hurdles

- Permian Basin produces about 6 million BPD, *but*
  - Local refining capacity is only 471,000 BPD
  - "Local" radius out to 250 miles from Midland

* From 2020-23, the U.S. lost 6 operable petroleum refineries. Nearly two-thirds of the "newest" refineries in the U.S. are merely expansions of existing plants. The last refinery built with significant capacity was in 1977, according to the EIA.

# Traditional Refining Tech

- Extensive high temperature / high pressure processes require abundant fuel burning
- Increased safety hazards of operations
- Thermal and process inefficiencies (higher costs)
- Intensive startup and ongoing regulatory permitting
- Large plant footprint required
- Insufficient domestic product output from shuttering of plants, leading to shortages of products
- Domestic refining with existing technology is the 3rd highest industrial sector greenhouse gas (GHG) emissions producer in the U.S. (EPA)

# The New Solution

+ Introducing NZET (patented Net Zero Emissions Technology)
+ Based on a closed-loop process using Flash to Vacuum separation
+ Modular construction centered on individual 3,400 BPD reactors
+ Scalable from 3,400 BPD to 100,000+ BPD
+ Capable of a wide range of feedstocks, from 8 to 50 API
+ Lower capital cost and shorter development timeline
+ Fewer permit requirements, especially emissions-related
+ Lower operating cost per barrel than traditional refineries

Cover Images & Right: Talley Refinery on 10 acres in Taft, CA utilizing the new NZET technology

# The New Environmental Solution

+ **Net Zero means *practically zero* emissions:**

Net emissions are so low that nature easily handles the rest, much like Earth's natural biome handling the CO2 from exhaled breath.

For example, an average 150,000 BPD refinery in California emits 2,041 metric tons CO2e per year[1], compared to 3.6 metric tons from a 150,000 BPD NZET facility[2], a reduction of over **99.8%**.

By comparison, a typical 4-person home emits **6.3** metric tons CO2e per year[3].

+ **Carbon Credit Generation**

CRI's NZET refinery will generate tens of thousands of carbon credits per year, made available to the offset market to provide an additional revenue stream.

The environment benefits from every barrel processed using NZET displaces those crude barrels that would have otherwise been subject to conventional refining processes.

1 - Sampling of 12 California refineries as reported by the California Air Resources board for 2022 (https://ww2.arb.ca.gov/applications/facility-search-engine)
2 – Projection is based on the actual emissions and production reported by the Talley Asphalt facility to the California Air Resources Board
3 - USPA (https://www.epa.gov/ghgemissions/assumption-and-references-household-carbon-footprint-calculator)

# NZET Basic Process – Liquids

+ Crude feedstock is settled for BS&W then desulfurized

+ Feedstock stream is pressurized up to 1000 psi, using supplemental heating as needed to spray into the reactor

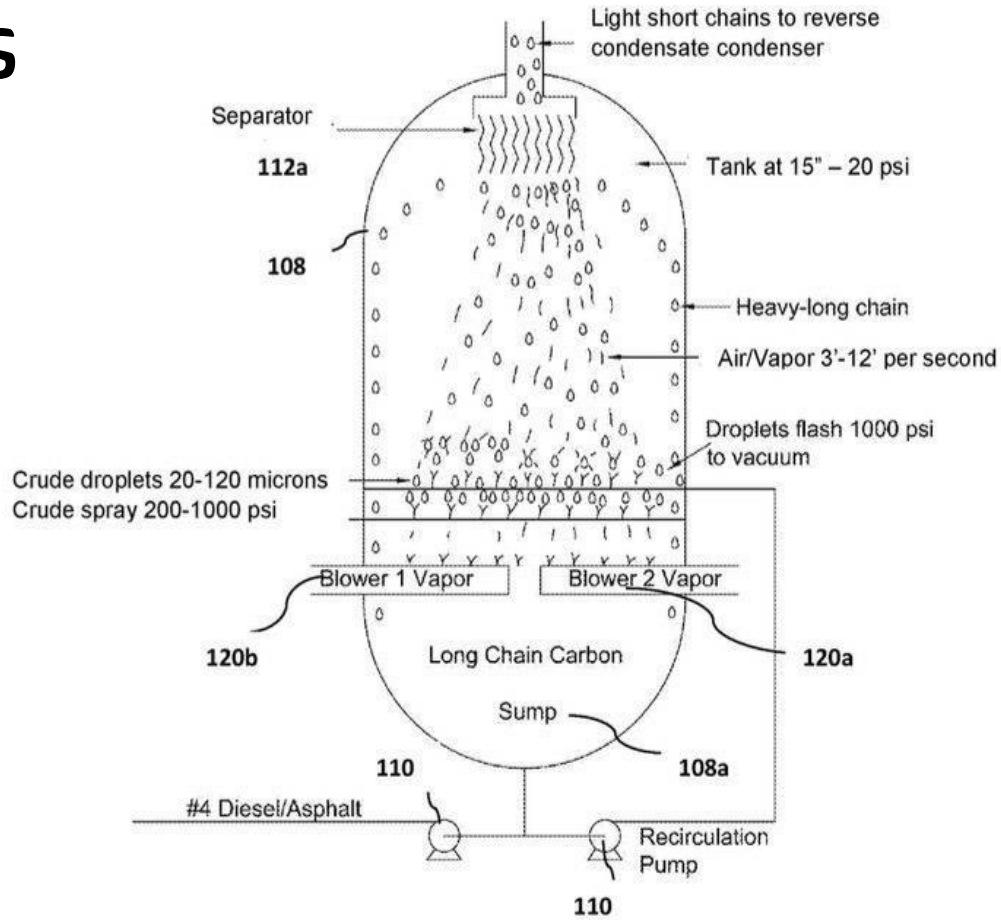
+ The spray is released into the heated/insulated reactor operating under vacuum conditions, flashing to vapor

+ The reactors can separate into few or many, gross stream cuts (e.g. naphtha, kerosene, etc.) resulting in lower temperature requirements; no cracking involved.

+ Additional cycles focus gross into net stream products of high purity, as desired. Both cycles and stream cuts are fully adjustable

+ Products are separated out of the vapor phase using cooling trays for each product condensed from the vapor phase

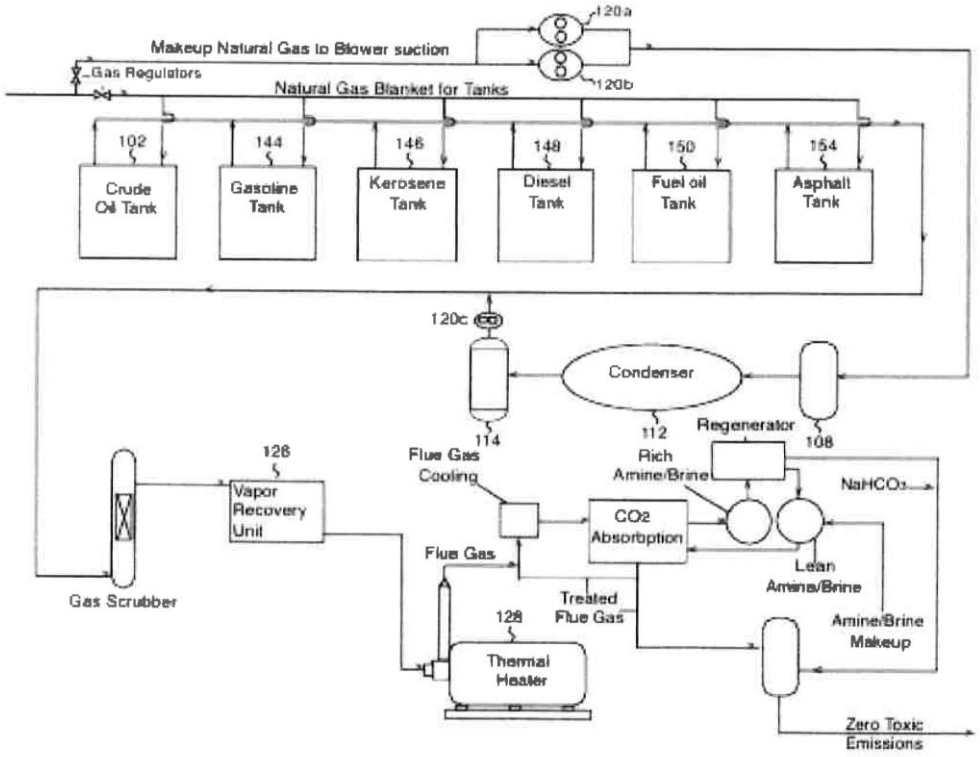
+ Heat is captured via heat exchangers to warm the feedstock




- Diagram excerpt from NZET patent

# NZET Basic Process - Gas

+ Lean gas is introduced into the reactor via blowers and proprietary nozzles to accelerate the vaporization from the vacuum flashing of feedstock
+ Wet gas exiting the reactor is stripped of liquids and scrubbed of its CO2 via regenerative amine "sweetening"
+ Liquids components are collected and sold as LPG
+ Remaining lean gas is used for tankage gas blankets or otherwise returned to the vacuum flashing cycle
+ Extracted CO2 is converted to sodium bicarbonate ("baking soda"), which in turn becomes an inert adsorbent bed for other impurities
+ The only exit product of this closed-loop system is non-aerosol, non-toxic baking soda with its adsorbed impurities that can be reprocessed for recovery of the sodium bicarbonate
+ Excess lean gas produced from the gas cycle can be burned for pre-heating of the feedstock or temperature maintenance of the reactor




- Diagram excerpt from NZET process description

# Goals

**Clean Refineries, Inc. is implementing its NZET technology in multiple locations in several states, utilizing its goals and advantages:**

- Provide refined products in demand to fuel American transportation and industry
  CRI will counter the U.S. trend toward fewer refineries and product shortages.
- Help communities to thrive through good paying job creation
  CRI estimates a 20,000 BPD plant could generate a payroll of over $6 million/year and 80 primary and 300-450 ancillary jobs. Employment scales with future expansion.
- Provide the opportunity for local investment to retain revenues within the local community
  Increased local returns on investment and improved tax base enables better community quality of life improvements.
- Provide real reduction in GHG through displacement away from conventional refining
  Until renewables and/or alternative prove economically viable, petroleum will continue to be necessary. CRI is providing the opportunity to improve the environmental impact of producing ongoing, needed products to keep our society working.
- NZET modularity and scalability enables it to have global application, especially in poorer countries seeking to develop higher-end petroleum products domestically instead of through imports.
  Over the last 2 years, CRI has been contacted by the governments of Australia, the Cree, Choctaw, Osage and Chickasaw Nations, Guinea, Ghana, Liberia, Cameroon, India, Gibraltar, Ukraine, Japan, Brazil, Dominican Republic, Panama, and Palau, so far.

  Clearly, there is a need and a desire, and CRI is positioned with the right technology at the right time.

# Structure & Funding

CRI (under subsidiary Green Fuels, LLC) will create a separate C-corp for each plant to allow for unique mixes of grants and local individual investment. Participants will buy into the established private shares of the C-corp. The plant (C-corp) will be locally owned/operated as under a franchise arrangement with Green Fields, LLC

Development funding will range from about $10 million to $21 million, depending on the status of acreage site acquisition. In the cases of Duncan and Dewey, Oklahoma, acreage is acquired. Permian acreage is still under negotiation. Major cost items within the development funding include the feedstock analysis of anticipated crude stream types and availabilities, and the EPC study (Engineering Procurement and Construction).

Grant writers retained by CRI will pursue available grants and loan options through federal agencies (DOE, USDA, EPA) as well as state and local programs (PACE, Municipal development boards). These sources of funding could provide up to half the project capital.

Private entities will have the opportunity for direct investment into the local plant (C-corp) to close the gap toward full funding.

Full plant project costs will range from $200-350 million, but will vary by capacity, land costs, crude mix, and product demands unique to each area. (See Proforma for more details)

# Clean Refineries Management Team

**Derek Williamson, Chief Executive Officer**

- 25+ years of experience in oil and gas industry
- Experience spans from land acquisition to service operations
- Educational background in mechanical engineering
- Member of Society of Petroleum Engineers

**Tony Gossett, Chief Operating Officer**

- 30+ years of experience operating oil and gas companies including Forestar Oil & Gas
- Experience in all phases of oil and gas process from drilling to build out
- Notable project experience includes: Forestar $1.36 billion development In Marchand formation (OK), and $606 million Driftwood acquisition and development by Sage Hill Energy Inc.
- Educational background in Minerals Engineering and specialization in Petroleum Engineering

**Kirk R. Brown, Chief Revenue Officer**

- 30 years of experience as a Business Development Executive
- Experience in early-stage start ups in sectors including: High Tech, Enterprise Storage, Security Software
- Notable experience in oil and gas storage

**Lauren Odquist, VP Corporate Development & Implementation**

- Experience in oil & gas industry spanning accounting, drilling operations, and land improvement
- Received Masters in Energy and Legal studies from Oklahoma City University
- Division 1, Softball player for University of Tulsa

# Clean Refineries Management Team – Designer Fuels

**George Snyder, Business Development Advisor**

- Designer Fuels, LLC, owner
- Inventor - Designer Fuels Patents
- Former U.S. Navy Admiral

**Darin Diorio, Technology Director**

- Designer Fuels, LLC, owner
- Inventor - Designer Fuels Patents

**Richard Dyer, Business Development Advisor**

- Designer Fuels, LLC, owner
- Inventor - Designer Fuels Patents
- Former U.S. Navy Seal

# Clean Refineries Advisory Team

**David Fowler, Permian Energy Partners, LLC**

- 35+ years of experience in oil and gas corporate management and merger, acquisitions and divestures
- Founder and President of Permian Energy Partners, LLC
- Former President of Ring Energy, LLC

**Zach Taylor, RKR Exploration**

- Served two term U.S. Congressman of Oklahoma
- Served two terms in Oklahoma State Senate
- Board member of Oklahoma Independent Petroleum Association

**Huling Parker Bowles III, Attorney and Oklahoma Corporation Commission Compliance Officer**

- Serves as an Oklahoma Independent Petroleum Association regulatory compliance officer
- 20+ years in various legal and advisory roles

**Kenny Weaver, VP Construction at CTIC Group**

- Serves as an Oklahoma Independent Petroleum Association regulatory compliance officer
- 30+ years of experience in hydrocarbon refining