**REQUEST FOR PROPOSAL**

**Background**

As a participant / sub-recipient of MACH2 consortium, PBF Energy intends to develop a low-carbon hydrogen production facility to economically produce hydrogen in line with the growing demand for low-carbon energy solutions. The clean hydrogen would serve as a feedstock for a potential world-scale methanol plant located at our Delaware Complex. (i.e., Delaware City or Paulsboro refinery) We expect the current scope of green hydrogen production to be approximately 50,000 MT/y (58 MMSCFD or 151 short tons/day), utilizing approximately 350 MW of electrolyzers.

Transportation access will be critical to create an economic methanol value chain from refinery gate to customer. PBF’s Delaware complex has access to world-class rail transportation and wharf access providing opportunities to ship and barge products along the US coast into major demand centers (e.g., New York Harbor, Philadelphia, Wilmington, NC and Chesapeake, VA) and into European markets.

PBF is requesting bids to perform a comprehensive market study of the global methanol market with a deep dive into the US and global shipping market. This study will inform PBF’s potential investment in the production of grey methanol or blue /green methanol. Please note, for PBF to produce blue methanol, the captured CO2 would either be sold as off-take and/or combined with green hydrogen to produce blue methanol. Underground sequestration in the Delaware Valley is not considered a viable alternative from a regulatory / permitting or cost perspective.

The purpose of the study is to understand the basic underlying fundamentals of methanol market formation to facilitate the following investment decisions: what “color” of methanol to produce; the cost-to-produce required to effectively compete on a global scale, where and to whom PBF’s products could be sold (“addressable demand”), and what price / revenue could be captured. To inform these choices, the RFP scope includes developing a “bottom’s up” assessment of supply, addressable demand, cost to produce, laid-in transportation cost, tax incentive implications, and price or “willingness to pay.” All analytic requests below should be completed for each grey, blue and green methanol with forecast estimates for the next ~5-years (short-term) and the next ~10-20-years. (long-term) We are also looking for best and worse case scenarios particularly around pricing and demand formation.

**H2 Derivative Market Study: Methanol**

1. **Create a methanol global supply / demand balance.** (grey, green, blue)

* Calculate global market size and CAGR.
* Forecast future demand by region.
  + Quantify material drivers of demand (i.e., tax incentives, GHG requirements, product growth)
  + Highlight demand differences by region.
* Forecast future supply by region.
  + Create a cost to produce curve by producer / by region. **(Important)**
  + Identify and quantify key drivers of cost by region.
  + Estimate impact of new construction projects on existing production.
* Forecast future global trade flows.
  + Create a base-case trade-flow forecast.
  + Identify if / how new production could impact supply and trade flow implications.
  + Highlight risk / opportunities for PBF / US producers.
* Evaluate historical and forecast future prices. (spot and contract)
  + Identify drivers of price and whether prices are globally, regionally or locally determined.
  + Compare and forecast grey, green and blue contract prices and spot prices.
  + Based on supply / demand, create a best/worst-case pricing scenario and trends to watch.
* Supplier should include all backup data and modeling with the final product.

1. **Create US methanol supply / demand balance for** **PADD 1, 2 & 3.** (grey, blue, green) *{Emphasize Importance & An estimate is ok}*

* Calculate market size and CAGR for each PADD.
  + Identify / quantify underlying drivers of demand. (i.e., product growth, tax incentives, GHG targets)
* Forecast future supply and demand balance by PADD.
  + Forecast best case and worse case future supply / demand scenarios.
  + Identify new production facilities and impact on supply / demand balance and price.
  + Identify “trade flow” scenarios between PADDs / exports.
  + Highlight opportunities for PBF.
* Rank suppliers by volume, type/color, destination, and landed cost.
  + Rank lowest cost suppliers with whom PBF will compete.
  + High-light material driver (s) of cost.
  + Provide best case and worse case supply cost scenarios and key risks.
* Identify and quantify key risks to PBF as a potential methanol producer.
* Supplier should include all backup data and modeling with the final product.

1. **PADD 1 methanol market go-to-market strategy.** (grey, green, blue) **{Most Important}**

* Estimate addressable demand available to PBF.
  + Rank customers by volume, use, type/color, location.
  + Estimate transportation mode and cost from refinery gate to fulfill demand.
  + Estimate breakeven laid-in cost required to capture customer demand.
  + Forecast a best case and worse case addressable demand.
* Perform pricing sensitivity by customer / hub.
  + Forecast future contract prices and spot prices.
  + Identify drivers of price and directional impact.
  + Forecast best and worse-price scenarios.
* Identify and quantify key risks of entering the US methanol market.

1. **Deep dive into the European methanol shipping market.** (grey, blue, green)

* Select 1-2 European markets that would be economic for PBF to export methanol (i.e., Rotterdam)
  + Calculate market size and CAGR for each market.
  + Forecast and segment future demand by customer and application.
* Forecast and compare “laid-in-cost” for the largest exporters to Europe.
  + Breakout cost-to-produce from transportation cost.
  + Rank lowest cost suppliers by landed cost with whom PBF will compete.
  + Assess the IMO and other tax incentives and the impact on cost and willingness to pay.
* Segment current & future methanol market structure by contract vs. spot.
  + Forecast spot and contract prices and compare across customer / application
  + Highlight drivers of price and impact on future curve.
  + Create high and low-price scenario by segment.
* Recommend / rank profitable pathways for PBF to enter the European market
* Identify best case and worse case addressable demand by segment, location and price.
* Highlight and quantify key risks.

Other Requirements:

PBF will require a weekly 30 minute status meeting

Key Milestones will include deliverables at the halfway point and another at project completion.