

Evergreen Oil, Inc.
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Evergreen Oil, Inc. Produces “Closed Loop” Re-Refined Oil

Evergreen Oil, Inc. (Evergreen) operates the only fully licensed part “B” re-refinery in the Western United States¹ dedicated to the production of virgin-like quality lube base oils, from used lube oil. Evergreen’s re-refinery is located in Newark, California.

Evergreen’s base oils have passed the laboratory and engine test requirements ensuring they meet all American Petroleum Institute (API) standards for the same cold-start pumpability, rust erosion, engine wear, and high performance standards as virgin oil; as well as warranty requirements for new automobiles. Evergreen’s base lubes are used in California government fleet vehicles as well as fleets in Minnesota, Vermont, Washington, and New York. The California cities of Los Angeles, Thousand Oaks, Santa Monica, San Francisco, Chula Vista and Sacramento all use re-refined oil in their fleets.

“Closed loop” recycling, from engine to re-refinery and back to the engine is the essence of Evergreen’s business. *Used motor oil is a renewable resource.* Motor oil never wears out; it only gets dirty, and can be re-refined into new lubricating oil in an endless recycled loop which saves energy and reduces greenhouse gas (GHG) emissions.

Evergreen hereby respectfully submits the following comments to the Petroleum Reduction Advisory Committee.

**DGS’ Petroleum Reduction Advisory Committee Should Include Re-refined Oil
in its Plan because of the Environmental and Energy Benefits**

The Legislative Counsel Digest explaining AB 236 unequivocally states that the revision of existing purchasing methodologies by the Department of General Services (DGS) shall be based upon: “environmental and energy benefits”.

The DGS Best Practices Manual explicitly identifies the “environmental and energy benefits of re-refined oil. It states: “[t]he *highest and best use* of used motor oil is to re-refine it into new motor oil...If more re-refined motor oil were purchased by fleet managers, less used oil would be available to be burned for fuel – resulting in fewer air emissions and a higher and better use for used motor oil”. The Manual goes on to state: “Compared to crude oil refining to produce virgin lubricating oil, producing lubricating oil from used motor oil requires less energy, and conserves valuable crude oil, a non-renewable resource.”

“Re-refined motor oil conserves the crude oil supply by re-using the motor oil rather than having to extract additional crude oil from diminishing domestic supplies or importing additional crude oil from foreign countries. For every gallon of used oil recycled, 2.5

¹ There are only two used oil re-refineries in the United States: Evergreen and Safety-Kleen. Safety-Kleen’s re-refinery is located in East Chicago, Indiana.

quarts of re-refined motor oil can be produced. Buying re-refined motor oil reduces our dependence on foreign oil.”

“Conserving our non-renewable oil supplies is not the only benefit. By buying re-refined motor oil, less used motor oil will be used as fuel, resulting in cleaner air (currently more than half of all used motor oil is recycled into fuel oil cutter stock, where it is blended with off-specification or heavy crude based materials and burned as fuel resulting in air pollution from phosphates, sulfur and heavy metals)”.

Recent Studies Have Further Documented the Environmental and Energy Benefits of Re-refined Oil

The nation produces 1.3 billion gallons of used oil annually, over 100 million gallons produced by California. According to the U.S. Environmental Protection Agency (EPA), by re-refining its used oil the nation would save 2.5 million gallons of oil per day. The same study concludes one gallon of re-refined used motor oil will yield the same 2.5 quarts of lubricating oil obtained from refining 42 gallons (one barrel) of virgin crude oil.

The American Petroleum Institute has concluded that it takes 50-85 percent less energy to produce a lubricant through re-refining used oil than to produce that same volume by refining virgin crude.

Recent European studies concluded that the average CO₂ equivalent burned of re-refined oil produces 42% less greenhouse gas emissions than the equivalent burden of virgin base oil (Groupement Europeen de l'Industrial Reperation 2007). A similar study by the Commonwealth of Massachusetts concluded that by purchasing 72,000 gallons of re-refined motor oil, a year, the state reduced greenhouse gas emissions by 270 tons (Executive Office for Administration and Finance 2007).

The U.S. Department of Energy (DOE) in its “Used Oil Re-refining Study to Address Energy Policy” (Chapter 7, 2006) cites energy conservation as justification for recommending re-refining used oil compared to refining virgin crude. In so doing, it states: “re-refining [is] the best solution from both energy resource preservation and environmental conservation perspectives.” The study concludes by saying that compared to crude oil refining to produce virgin lubricating oil, producing lubricating oil from used motor oil requires one-third the energy of refining crude oil, while conserving valuable crude oil, a non-renewable resource.

Boughton and Horvath (2004) and GEIR (2005) cite increased air quality as justification for recommending re-refining over direct burning of used oil (RFO).

The California Integrated Waste Management Board (CIWMB) has concluded that “closed-loop” recycling is “highest and best use” of a resource.

Lawrence Livermore National Laboratory (LLNL), at the request of the CIWMB, recently studied the benefits of re-refined oil and identified re-refining as the “highest and best use” of the resource. In so doing, the report focuses on the energy and greenhouse gas savings along with the “closed-loop” nature of re-refining.

According to Cal EPA, re-refining oils can lead to additional environmental benefits because the toxic heavy metals (e.g., zinc, lead, cadmium, and chromium) are extracted from the used oil. These metal compounds are solidified and stabilized into asphalt flux, thereby posing minimal environmental risk.²

There can be no doubt that by California Fleets Re-refining their Used Oil and using Re-refined Oil in their Vehicles, the State would Achieve Significant “Environmental and Energy Benefits”.

In analyzing synthetic motor oils, it must be noted that the amount of energy required to manufacture synthetic lubricant oil is estimated to be about *three times* that of mineral-based oil³ (*whereas re-refining used oil takes one-third the energy of manufacturing from virgin crude*).

Recent Studies Show from a Life-Cycle Analysis, Re-refined Oil is Less Expensive than Synthetic Oil, Takes Less Energy to Manufacture, and is not Toxic to the Environment

Synthetic oils are composed primarily of crude oil base stock; there are, therefore, no “life cycle” advantages to using synthetic oils. Most synthetic motor oils are fabricated by polymerizing short chain hydrocarbon molecules (alpha-olefins) into longer chain hydrocarbon polymers called polyalpha-olefins (PAOs)⁴.

The initial costs of synthetic oils are between two and four times more expensive than petroleum based oils.⁵

A two year Consumer Reports study of motor oil in New York City taxi cabs found no noticeable advantage of synthetic oil over regular oil.⁶

As lubricant oils lubricate engines they accumulate PAHs. Higher concentrations of PAHs have been found in used synthetic oil leading to greater engine particulate emissions.⁷

Because synthetic lubricants degrade more rapidly in soil and aquatic systems (they show higher biodegradability than mineral oils because of their higher degree of hydrocarbon chain linearity), they cause more environmental damage than conventional lubricant oils.⁸

² Polynuclear hydrocarbons are removed by hydrotreatment, and phenols are converted to a fuel byproduct or to wastewater treatment.

³ Denton, Review of Synthetic Motor Oils, Office of Environmental Health Hazard Assessment California Environmental Protection Agency (2007): “it should be considered that the amount of energy required to manufacture synthetic lubricant oil is estimated to be about *three times that of mineral-based lubricant oil*”. (emphasis added at p7)

⁴ Denton, Review of Synthetic Motor Oils, Office of Environmental Health Hazard Assessment California Environmental protection Agency (2007 at p2).

⁵ API (2006)

⁶ New York City Department of Transportation (2005)

⁷ Denton, Review of Synthetic Oils, Office of Environmental Health Hazard Assessment California Environmental Protection Agency (2007 at p 5): “... one of the potential implications of these longer drain intervals is that used synthetic engine oil may contain more PAHs and therefore pose a greater risk to human health...The recycling of used oil with higher PAH levels...may similarly result in higher exposure to PAHs.”

California Statutes, Including AB 236 and AB 32 Allow DGS to Promote Re-refined Oil

Public Contract Code. Public Contract Code (PCC) section 12203 requires State agencies to ensure that at least 50 percent of the dollars spent on lubricating oils (LO) be spent on LO's with a base oil content consisting of at least 70 percent re-refined oil.

PCC section 12205 requires all State agencies to obtain from all suppliers written certification of the post-consumer recycled content of each product offered or sold to the State.

PCC sections 10405-10409 require State and local agencies to purchase lubricating oil...from the seller whose oil product contains the greater percentage of recycled oil.

AB 236 - AB 236, Section 25722.8 (“a plan to improve the overall state fleet’s use of alternative fuels, synthetic lubricants, and fuel-efficient vehicles...”) cannot be read to exclude an analysis of “closed-loop” re-refined oil.

Oil is an indispensable part of the vehicle fuel/ transportation system; vehicles cannot run without it. All of the same energy conservation/GHG considerations which apply to “fuels”, also apply to oil **and** re-refined oil. As such, any analysis of alternative fuels, synthetic lubricants, and fuel-efficient vehicles should include the very unique waste product-“closed loop recycled” (i.e. re-refined) used oil.

Re-refined oil is an alternative to oil with energy and GHG benefits. As pointed out above, re-refined oil is cheaper than synthetic oil and is less energy intensive. Because some synthetic oils cannot be re-refined and become a waste product subject to burning, re-refined oil, at the very least, is as energy and GHG efficient as synthetic oils.

Section 25722.8, of AB 236, acknowledges the importance of studying oil as part of conserving energy and reducing GHG emissions from state fleets by referring to *synthetic lubricants*.

While Evergreen believes it was an oversight to not specifically include re-refined oil in the analysis, the statute is replete with references leading to the conclusion that the Committee should consider the energy and greenhouse gas (GHG) benefits of re-refined oil.

AB 236 SECTION 1. Section 25722.5 (a) (1) refers to “[m]inimum air pollution emission[s]; (2) (A) requires [evaluat[ing] and scor[ing] emissions...in addition to capital costs to enable the Department of General Services to choose the...lowest life-cycle cost...”⁹

⁸ Ibid. at 8:”Synthetic...lubricants are degraded more rapidly in soil and in aquatic systems than traditional mineral oil-based products. PAOs show higher biodegradability than mineral oils of equivalent viscosity because of their higher degree of hydrocarbon chain linearity.” Also see: Haigh, 1995; Boyde, 2002.

⁹ DGS Best Practices Manual states: “By buying re-refined motor oil, less used motor oil will be used as fuel, resulting in cleaner air...” (emphasis added).

AB 236 Section 2. Section 25722.6 (a) (1): “*The vehicle rankings shall include both of the following criteria:*

(1) the reduction in greenhouse gas emissions, air pollutant emissions...on a full fuel-cycle basis...”

(2) the life-cycle costs of the vehicle and fuel, including maintenance (emphasis added).”

AB 32. The California Air Resources Board (CARB) is considering how to integrate re-refined oil into its AB 32 mandated rule making precisely because re-refining saves energy and reduces GHG emissions in the transportation sector.¹⁰ California recognizes that re-refining used oil as compared to refining virgin crude oil saves both energy and greenhouse gas emissions. In response to a law suit filed by the State of California, over GHG emissions, ConocoPhillips agreed to pay \$10 million for projects that would curb greenhouse gases in an attempt to compensate for releasing an additional 500,000 tons of carbon dioxide a year subsequent to the expansion of its Rodeo refinery in 2009¹¹.

Conclusion

For the above stated reasons, Evergreen respectfully requests that the Committee consider integrating re-refined oil into its “*blue print*” report for the Governor and Legislature.

¹⁰ Transportation contributes 39% of California’s gross GHG emissions. Under AB 32, targeting this sector is one of the key elements in the state’s efforts to reduce GHG emissions. According to the American Petroleum Institute (API), more than one billion gallons of motor oil are sold in the United States annually. Motor oil, and the refining of oil, is an integral, indispensable part of the transportation emissions profile.

¹¹ Connecticut, Delaware, Massachusetts, Maine, New Hampshire, New Mexico, Oregon, Rhode Island, Vermont, and Washington have joined litigation seeking refinery reductions in GHG emissions. GHG emissions from refineries in California are estimated to be 35 MMTCO₂E. Global-warming pollution from Midwest oil refineries alone is expected to grow by as much as 40 percent during the next decade. Oil refineries pumped more than 250 million tons of carbon dioxide into the air in 2004 constituting, along with chemical plants, the second greatest source of GHG. According to estimates from the Department of Energy, annual carbon emissions from petroleum refineries will increase to more than 415 million tons by 2030. On the other hand, the US Department of Energy has concluded that it takes one-third less energy to re-refine used oil than to refine virgin crude into motor oil.