BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of: Application No. 2013-01 TESORO SAVAGE, LLC TESORO SAVAGE DISTRIBUTION TERMINAL	CASE NO. 15-001 SWORN PRE-FILED TESTIMONY OF BRAD ROACH

I, Brad Roach, state as follows:

1. I swear under the penalty of perjury of the laws of Washington and the United States that the following testimony is true and correct.

2. I am over eighteen years of age and am otherwise competent to testify in this case. My testimony is based upon my education, training, experience, professional qualifications, and understanding of the matters herein.

I. EXPERT QUALIFICATIONS AND FAMILIARITY WITH PROJECT

3. I am the Senior Director, Market Analysis, and Senior Economist in the Strategy and Business Development department for Tesoro Companies, Inc. ("Tesoro") I am responsible for developing the short term and the long term market outlook for the corporation as well as continually evaluating new and emerging trends that may affect the downstream energy industry. I joined Tesoro in 2007 as Director, Strategy and Economics.

4. Prior to joining Tesoro, I worked throughout the downstream oil refining and marketing value chain primarily on the US Gulf Coast. This includes plant level and corporate level experience in a variety of technical and business roles. I worked for 21 years with CITGO/Petróleos de Venezuela, S.A., ("PdVSA") and previously worked with Celanese Chemical and the Coastal Corporation.

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5. I hold a Bachelor of Science degree in Chemical Engineering from Texas A&M University in College Station, Texas and a Masters of Arts in Economics from The University of Texas - San Antonio, Texas. A true and correct copy of my CV is attached hereto as Attachment A.

6. During my tenure with Tesoro beginning in January of 2007, Tesoro has grown from a modest sized independent refiner to the largest refiner (independent or major) on the US West Coast. This has benefits but also has challenges. Benefits accrue mainly from system optimization and synergy with the accompanying economies of scale that comes from larger size. Challenges include (1) a higher complexity of operation, (2) managing the large throughput of crude supply and feedstocks that a system of this size entails, and (3) distributing a large volume of products in a reliable, safe, and efficient manner. To that end, Tesoro seeks to competitively and economically secure crude oil supply from multiple sources in order to provide security, economic, and ratability of supply of transportation fuels with minimal disruptions. In my role with Tesoro, I am involved in helping assess and navigate these specific challenges. Through that professional experience and my experience with other employers prior to Tesoro, I am very familiar with industry trends and issues related to crude oil sources and supply to refineries, particularly to the West Coast. In my employment capacity, I am regularly asked to evaluate industry trends and to project crude supply needs and consumer demands using economic statistics and data. Accordingly, based on my professional experiences I have developed expertise in crude oil markets and economic trends including consumer demand, sources of supply, and industry projections.

7. I am familiar with the Vancouver Energy Project (herein after the "Terminal" or "Project"). In my position with Tesoro, I was asked to help evaluate the

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economic context for the Project. Accordingly, the purpose of this declaration is to provide the economic background for the Project as it relates to the ability to supply crude oil for Tesoro Corporation's refineries and other refineries on the West Coast and to explain the purpose of and need for the Project.

II. BACKGROUND of PADD V INFRASTRUCTURE

8. As a general introduction, the Country is divided for purposes of petroleum infrastructure and refining into regional Petroleum Administration for Defense Districts ("PADD") by the U.S. Department of Energy. Attachment B is a map prepared by the U.S. Energy Information Administration that depicts the PADDs. (*See* http://www.eia.gov/petroleum/marketing/monthly/pdf/paddmap.pdf):

9. These districts were originally established during World War II by the PAW ("Petroleum Administration for War") in an effort to help manage the countries fuel supply. The PAW was abolished after WWII concluded, but the designations were kept and became a part of the Defense Production Act of 1950, which created the Petroleum Administration for Defense and renamed the same districts to be the Petroleum Administration for Defense Districts. These are often referred to by their acronym "PADD". These PADDs allow for the collection of data at this district level to give some measure of granularity to the understanding of petroleum flows with in the U.S. Because population, economic activity, geography, and transportation infrastructure varies significantly from PADD to PADD, the PADDs have a varied composition between themselves in terms of petroleum components and infrastructure.

10. The region most relevant to this project is PADD V, comprised of the Western US with AK, WA, CA, OR, NV, AZ, and HI. However, as relates to market structure, the other PADDs have an impact on PADD V, particularly the adjacent districts

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of PADD III (comprising the US Gulf Coast) and PADD 4 (the Rocky Mountain Region). Within each PADD, there can be oil producing fields, refineries for processing crude oil, and a consuming base that is supplied transportation fuels from the refineries. However, the ratio of production to refining capacity as well as the ratio of refining capacity to consumers is quite varied between PADDs. Thus, some regions (e.g. PADD III) have large amounts of refining capacity above demand, while other regions (e.g. PADD I) have the reverse, i.e. a large consumer base with relatively small refining capacity. A network of pipelines and ship movements generally interconnects the regions to transfer raw materials or products to the appropriate consuming region, and resolves these imbalances. Both the refineries and the interconnecting infrastructure have developed over decades as population trends, energy intensity of regions, and economic activities have grown and evolved.

11. However, geographical challenges have limited the development of some infrastructure due to expense and distance. For example, he Gulf of Mexico poses such a barrier for direct pipeline supply from the refining centers in Texas to supply the densely populated areas of Florida. Rather than using pipeline, product supply typically occurs by waterborne vessels. Similarly, the Rocky Mountains pose a barrier owing to the rugged terrain and distance from producing regions to refining centers. Relatively few pipelines exist and these are generally smaller size product pipelines rather than the larger crude oil pipelines. Whereas the Mid-continent (PADD II) region is connected to the U.S. Gulf Coast region (PADD III) by many crude oil pipelines, there are essentially no crude oil pipelines supplying the West Coast from the rest of the US mainland. Attachment C was prepared by the Canadian Association of Petroleum Producers to show existing pipeline infrastructure. As depicted in the graphic the only pipeline connecting PADD V with other continental sources enters from the North from Canada. The pipeline extends only

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to northern Washington and there are no connections to the rest of PADD V. Moreover, the size of that pipeline limits its capacity 300 MPBD (300,000 barrels per day) such that its maximum capacity is unable to fill PADD V's refining needs, described in further detail below.

12. Though this may at first seem like a circumstance related solely to geography, it also involves the issue of oil production whereby the West Coast region was at one time a prolific producer of crude oil relative to demand and there was no need for additional pipelines during the decades that pipeline infrastructure was being built-out in other regions. The West Coast refiners had significant supply of endogenous crude oil from the California oil fields, as well as from the Alaskan North Slope (ANS) oil fields beginning in the mid-1970's. California production was generally carried to California refineries via intrastate pipelines, whereas ANS flowed from northern Alaska to the trans-loading port in south Alaska and thereby to West Coast refineries via cargo ship. Thus the PADD V refinery system grew around these two central sources during the years that consumer energy demand was strong and growing.

13. Although the refining processes are well established, they require a fairly narrow range of operation and process conditions to achieve the most economical, safe, and reliable operations. Most refineries are designed around the quality characteristics of a specific crude oil deemed to be plentiful for each geographic setting. Thus, PADD V refineries were designed around the California crudes and the Alaskan North Slope crude oil. Although it is possible to process crudes different than the design crude, it often introduces inefficiencies that are uneconomic or can limit the throughput of oil due to internal constraints. As crude supply has varied over the years, blending of crudes has become very common whereby a blend of multiple crude oils can create a "look-alike" of the design crude and allow these other crudes to be processed as a blend. This takes

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careful planning, execution, and reliable and flexible supply system to accomplish. Additionally, as crude oil supplies from a given producing field grow and contract due to its production life, there is an ever-changing challenge to provide a compatible crude supply to the refineries under consideration (PADD V). This requires flexibility to a accommodate supply from current and future supply regions. Since PADD V refineries have no pipeline access to other US sourced crudes, they typically import foreign crude oil from other producing countries (including Canada for the refineries in the Pacific Northwest). Thus these supplies come via tanker ship to the West Coast refineries.

14. Tesoro has 4 refineries on the US West Coast in PADD V that are integrated into the transportation fuel supply and demand network:

- Tesoro Alaska (Kenai, AK) 72 MBPD;
- Tesoro Anacortes (Anacortes, WA) 120 MBPD;
- Tesoro Golden Eagle (Martinez, CA) 166 MBPD; and
- Tesoro Los Angeles (Los Angeles, CA) 380 MBPD.

15. Three of these refineries are above the average capacity of 95 MBPD represented by EIA's refinery configuration data for PADD V. The Los Angeles refinery, with a capacity of 380 MBPD, is the largest single refinery complex on the West Coast. Additionally, Tesoro's West Coast refinery total capacity of 738 MBPD is the largest refining system on the West Coast today as well as in prior history and represents approximately 25% of the West Coast refining capacity.

III. DEMAND FOR CRUDE OIL IN PADD V

16. The West Coast refineries exist primarily to provide transportation fuel for the economic benefit of the western states. Hydrocarbon fuels are the economic fuel of choice for transportation owing to the ease of distribution, energy density, scalability,

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reliability, and economic value. This is shown in Attachment D from the Lawrence Livermore National Laboratory, a notable research organization in association with the Department of Energy, which shows various sources of energy and the uses to which they are put, generally. This example diagram is specific to California with the latest state level data available being for 2012, but is generally representative of West Coast trends. Other PADD V states along with a composite for the entire US for subsequent years are included in Attachment D. All these figures show the integral nature of petroleum as a prime source of transportation energy. As noted in the figure, liquid fuels (shown in the dark green band at the bottom of the figure) are integral to transportation, comprising 96.5% of the energy used in transportation for California. For the entire PADD V, petroleum provides 95% of the energy for transportation. Natural gas (blue band near middle) and other sources are more suitable for stationary energy needs. When combined together, natural gas, petroleum, along with a small contribution from coal, comprise over 80% of California's energy supply. Inasmuch as transportation energy is integral to trade and commerce, regulations and other market forces which impact the use of transportation fuels can have significant impact on the overall economy as a whole.

17. The PADD V region of the US has used progressively more transportation fuel as the economy grew to over $3Trillion dollars based on data from the Bureau of Economic Analysis for chain weighted GDP(Real) for 2014 for PADD V states despite a slowdown with the financial collapse of 2008. Based on data related to vehicle use, there were two factors that were the primary drivers of this increased demand: increased Vehicle Miles Traveled and increased concentration of motor vehicles. Vehicle Miles Traveled ("VMT") refers to the aggregate number of miles travelled by vehicles in a defined region. This is typically determined by the state highway departments and/or the Federal Highway Administration. The specific trend in VMT is shown in Attachment E

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(*See* http://www.dot.ca.gov/trafficops/census/docs/VMTHIST1.pdf) for California which comprises approximately 60% of the transportation energy consumption in the PADD V Western US region. (NOTE: VMT data for other states is shown in Attachment F, for reference though the data for historical values for the same period as California were not readily available).

18. Concentration of motor vehicles refers to the number of vehicles that are in operation per 1,000 people. Data for the overall increase in the vehicle saturation for the U.S. is shown in Attachment G from the National Transportation Data Book, 2015 Edition, and is representative of the vehicle concentration that exists in the Western part of the U.S.

19. These factors, combined with economic growth of the region have increased gasoline consumption over the same time period. This has been demonstrated in the historical growth as shown in the chart attached hereto as Attachment H based on EIA data.

20. To project future demand for petroleum products in PADD V, I rely on various sources of information from the Energy Information Administration of the DOE, and state energy and taxing agencies, as well as expert opinions of third party consulting firms. This includes information we receive from the California Energy Commission ("CEC"), an agency that is the State of California's primary energy policy and planning agency which has several core responsibilities including forecasting future energy needs. I, along with other Tesoro personnel, periodically attend presentations and workshops provided by the CEC and also have individual meetings to provide a briefing on the state's

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energy outlook. The input from the CEC, although not specific to any company individually (due to appropriate proprietary precautions), is an important reference as a whole for the state fuel use due to the unique nature of the CEC's position to see data routinely reported to the agency by a variety of sources that are unavailable to company analysts. Thus their perspective is a well-informed view.

21. Again, because the state of California constitutes 2/3rds of the transportation energy use in the PADD V Western US region, California's projections are representative of the entirety of PADD V. According to the CEC, in briefings to Tesoro on April 14, 2016, expectations are for the improving economy combined with impact of a lower oil price environment to spur continued growth in gasoline demand through the end of the decade with the demand plateauing in the 2020 timeframe. This plateau in 2020 is the result of improved efficiencies from the increasing Corporate Average Fuel Economy ("CAFE")[1] standard which then lead to the beginnings of a slight decline in gasoline demand (approximately 0.5%/year) thereafter. Conversely, according to the CEC, and other consulting firms, diesel and kerosene demand are expected to continue slight growth in the range of 1% as economic activity continues to grow. These trends are depicted in Attachment I which shows the historical demand based on EIA data for the three principal transportations fuels: gasoline, jet fuel (kerosene), and diesel along with forecasted trends based on the outlooks defined above.

[1] Corporate Average Fuel Economy Standards are regulations that intended to improve the average fuel economy of cars and light trucks.

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22. This changing product slate over the long term (declining gasoline and increasing distillates) will require adjustment of operation and potentially changes to feedstocks to readjust to the product demand. However, overall, this maintains a relatively consistent need for crude oil feedstock overall along with flexibility to adjust qualities to match production needs. The Annual Energy Outlook ("AEO")[2] 2015 outlook for transportation energy in MBPD of oil equivalent over the next several decades is provided in Attachment J which shows that in conjunction with the slight decline in gasoline demand through 2040, overall crude oil equivalent demand stabilizes with only a 5% overall reduction before trending higher in later years owing to increasing distillate use from economic growth.

IV. AVAILABILITY OF ALTERNATE (ELECTRIC) TRANSPORTATION ENERGY

23. The prior graph and discussion shows a continued use of transportation energy that is relatively similar to today's environment. However, that information is in oil equivalents, i.e. as if all of that transportation energy is provided by petroleum. In today's environment this is essentially the case as shown by the previously mentioned Lawrence Livermore National Laboratory/DOE energy flow maps with 95% being petroleum based. Large-scale turnover of the U.S. transportation fleet (light duty cars and trucks as well as heavy duty vehicles) to alternate energy sources would be required to displace petroleum from its current state of supply of the transportation energy demand.

24. The speed of any potential decline in gasoline demand is impacted by further changes to the CAFE standard, the rate of vehicle fleet turnover to the higher

[2] Annual Energy Outlook is prepared by the U.S. Energy Information Administration and focuses on the factors expected to shape U.S. energy markets through 2040 (for 15 years into the future).

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efficiency vehicles, as well as the adoption of alternative fuel or alternative energy vehicles in the West Coast automobile fleet.

25. An important element in these trends and projections is the degree to which the advent and incorporation of electric vehicles into the consumer vehicle fleet impacts demand for gasoline (and diesel). Electric vehicles are a potential replacement for conventional hydrocarbon fuels and have recently gained significant publicity. I am aware of several public comments related to the Project that have questioned the projected demand for petroleum fuels based on the commenter's perception of the impact of electric vehicle technology. Despite the popularity and the expectations among many, this new market entrant has several factors that may limit rapid adoption of the technology. Because of these factors, although electric vehicles are gaining acceptance with some segments of the consumers, they will not be able to gain the wholesale acceptance needed to turn over the large car fleet of approximately 35-40 million vehicles in PADD V over the time span of the Project. Thus, it is my opinion that petroleum will continue to be an integral part of transportation energy during this time and the Project will have an important role to play in the West Coast supply of crude oil. Electric vehicles, although making progress, remain outside the price level and usability that is needed to gain the large-scale vehicle fleet turnover required to substantially reduce the hydrocarbon fuel requirement over the next decades. This owes to multiple factors including battery technology which relates to distance traveled between charge and charging technologies, and large-scale consumer acceptance.

26. Battery technology continues to make progress, with advances made through battery design and also through economies of scale. Attachment K shows recent updates from an MIT study regarding the evolution of battery technology with the expected path toward the economic break point considered critical for large-scale

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consumer acceptance. The authors of the MIT study project the point in the latter part of the next decade, almost 10 years away.

27. Additionally, the price distribution of vehicles provides an additional impediment to rapid fleet turnover, even as the battery target price is met. The distribution of car prices is heavily skewed to the high side which gives an inflated "average new car sales price" in the range of $32K. However, approximately 60% of the car market is below this with the bulk of new car sales below $32K. With new models of electric vehicles pricing at and above this price level (Nissan Leaf SV - $34K, Chevy Volt - $34k, Tesla Model 3 - $35K, BMWi3 - $42K), this provides a large consumer barrier to rapid fleet turnover. (*See* Attachment L)

28. Additionally, during the period under consideration (projected 15-20 year Project horizon) CAFE standards are increasing which bring extended range and convenience to conventionally fueled vehicles. As a matter of consumer impact, CAFE gains in fuel economy further reduce the value proposition of EV's relative to the conventional vehicles. With 45 mpg (2023 CAFE goal), a vehicle with a 15 gallon tank can travel almost 670 miles before refueling at a conventional filling station in generally 10 minutes or less. Conversely, electric vehicles are targeting 200-300 mile range with full charge, which can take 20-30 minutes in a supercharging station (Tesla) or multiple hours in a home charging arrangement. This will bring a choice between range anxiety and long-range capability. This choice will impede the decision for fleet operators as well as individuals.

29. Recent sales data show the relatively low volume of electric vehicles and even declining trends in hybrids. The data shown in Attachment M from the California New Car Dealers Association in their February, 2016 update shows flat to declining sales trends for the

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alternative vehicles and at levels that limit their impact on fleet turnover.

30. Even if these consumer issues resolve, consumer acceptance will still be impeded by the infrastructure of family dwellings. According to HUD's latest survey, the American Home Survey 2013, some 30-40% of family dwellings do not have garages or carports which support the safe charging of electric vehicles. With a large swath of the population unable support EV charging, their choices will tend toward the conventional fuels and slow the turnover of the vehicle fleet away from conventional fuels. In California, legislation has been introduced to incorporate charging capabilities into new construction; however, given the substantial amount of pre-existing housing stock not subject to these new construction requirements, there will be a slow turnover of residential charging capability that has to occur to begin to enable the turnover of the automobile fleet to EV's. (*See* Attachment N).

31. These points are evident in the forecast of future vehicle fleet make-up according to the U.S. Energy Information Administration's ("EIA") Annual Energy Outlook ("AEO") from 2015. Approximately 98% of the existing US vehicle fleet is based on the internal combustion engine ("ICE") with gasoline as the primary fuel. This includes flex fuel vehicles, which are modified to allow higher levels of ethanol but remain essentially an ICE. This fleet comprises over 200 million vehicles and is forecast to grow over the next 2 decades. The California market alone is comprised of 34.3 million registered vehicles, according to the California Department of Motor Vehicles (https://www.dmv.ca.gov). The continued need for transportation fuels such as gasoline and diesel will continue to be driven by the large and growing population of ICE engines. Per EIA estimates (AEO 2015) the U.S. light duty fleet (cars and trucks) increases to approximately 270 million vehicles by 2040, with 95% of the vehicles using some version of internal combustion engine as the motive force. A significant change in vehicle fleet

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composition would be needed to fundamentally change the demand for hydrocarbon fuels which in turn affects the need for reliable and economic crude supply of which the Project is a part. (*See* Attachment O)

32. In summary, given the current status of the EV market and the factors that will impede fleet turnover, it is unlikely that EV's will create a significant transformation of the vehicle fleet in the next decade as borne out by the EIA projections above. As noted earlier, during this time the California Energy Commission expects California gasoline demand to continue to grow through 2020 before plateauing due to efficiency gains. Because California represents approximately 2/3rds of the West Coast gasoline market this trend alone will continue to create the need for hydrocarbon fueling capabilities. It is also reasonable to assume that the other 1/3rd of the PADD V demand (WA, OR, NV, AZ, AK, HA) will see similar pattern in their demand as they are intimately tied to the large CA economy. In this regards, demand for gasoline would continue to increase through 2020 before plateauing. This creates a stronger demand for gasoline than exists today and increases to near the 2006 peak. Hydrocarbon fuels will continue to be an important source of transportation fuel energy and support the West Coast economic functioning. As the largest refiner on the US West Coast, Tesoro is following due diligence to ensure continued safe, reliable, and economic supply of these transportation fuels.

33. The disconnect between popular expectations for a new transportation energy market entrant and the more realistic market performance has played out recently in an analogous situation in the last decade with expectations for cellulosic ethanol. Cellulosic ethanol was incorporated into EPA renewable fuel standards at 4.25 BGY when originally analyzed in 2004. It now has been reduced by approximately 95% to 0.2BGY. Such technological promises which fall significantly short of popular expectations create

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significant uncertainty for capital intensive industries such as the refining industry. For the reasons explained above, in my opinion, the expectations that electric vehicles will substantially compact the need for hydrocarbon transportation fuels over the Project life are unsupported and overstated.

V. DECLINING CRUDE OIL SOURCES OF SUPPLY TO PADD V

34. The ability to respond to this continuing demand for petroleum fuels, that as described above will not be suppressed by transformation to electric vehicles, is a critical factor for the refining industry, including Tesoro. A key aspect of this is securing adequate, consistent, and economic supplies of crude oil as the main feedstock for the refinery to maintain consistent, safe, reliable operations. With a large refining system, acquiring crude oil is a major commercial activity for the company. This is particularly true in view of the well-established fact that the crude oils that were endogenous to this region are in a long-standing decline. During my approximately 10 years tenure at Tesoro, the combined production of California and Alaska has declined approximately 350 MBPD which is the supply to 3 average West Coast refineries (based on EIA data of 2.9MM BPD Capacity for 31 Refineries). The trend of supply from California and Alaska since 1985 is depicted in Attachment P, which was created using data from the EIA and the Alaska Department of Revenue, Tax Division.

35. At the time of this statement, significant investments in oil production have been cancelled or deferred such that the decline is projected to continue as evidenced by the Alaskan state government's latest revenue projections which are based on detailed assessments of production outlooks (Alaska Department of Revenue, Tax Division, Spring Report, 2016). Thus, this decline in production is expected to continue. If the decline continues at historical rates, over the next 10 years an additional decline of ~300 BPD of

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production from Alaska and California will occur which is near the design capacity of the VE Project. Given the outlook described above for the continuing dependence (and even near term growth) of hydrocarbon transportation fuels, refiners will continue to need to source supply to provide the needed fuels, and the existing sources of that supply are not projected to meet that demand. (*See* Attachment Q)

36. Also, the Alaskan North Slope crude is transported via the TAPS (Trans Alaska Pipeline System) from the northern region of the state to the southern coast where it is trans-loaded on ships for supply West Coast refiners (including Tesoro). This TAPS system has a well-publicized issue of low pipeline flow due to the reduced ANS production and is already experiencing flow issues (http://www.alyeska-pipe.com/TAPS/PipelineOperations/LowFlowOperations). In other words, the TAPS system does not function well as flows reduce below adequate performance levels. The Alyeska Low Flow Impact Study July, 2011 identified the problematic range to be the 300-600 MBPD flow range, with difficulties existing below the 350MBPD level. This 350 MBPD level is conceivably reached within the next 10 years if historic production decline rates continue. The pipeline had a throughput of 508 MBPD in 2015, which is within the problematic range (*See* http://www.alyeska-pipe.com/TAPS/PipelineOperations/Throughput). It is not known at this time what the ramifications of this will be, but it represents a potentially significant additional uncertainty in the supply structure of West Coast refineries.

37. To continue operating to serve the West Coast market, refiners have had to access crude oil supply from other regions. In particular, Washington refineries rely significantly on crude oil from Alaska, such that the decline in supply is forcing Washington refineries to find alternate sources. Owing to the geographic location on the

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U.S. West Coast, these supplies are typically transported by water with a very limited ability to source via pipeline from the rest of the U.S. as discussed in paragraph 11.

38. The sources for these other crudes are generally located in other regions of the globe which have substantially more risk than sources in North America. Such country risks then translate to supply uncertainty for the refineries and in turn, the end-users of the refined product such as transportation and industries dependent on transportation. The country risk that exists in other regions is multi-dimensional. However one aspect of that risk, the ability to transact with transparency in other regions, is monitored by non-governmental (and not oil industry related) organizations. One such representation, prepared combining information from Transparency International and the BP Statistical Data Book is shown in Attachment R with the relative size of the hydrocarbon reserves shown which is indicative of the sources for crude oil to the refiners of the US (including West Coast, East Coast, and Gulf Coast refiners).

39. As reflected in Attachment Q, the sources of these oil supplies typically lies in regions much more open to corrupt business practices and low transparency. The falling production of West Coast oil fields requires more imports of crude oil from areas less suited to equitable trade. Also, as is generally known, many of these regions are subject to geopolitical tensions, which can create open conflict in either, or both, the producing region or the key transit routes around the region. Interruptions of this nature will limit the availability of economic and reliable crude supply to the U.S. (including the West Coast) and increase the need for an available and flexible supply routes for the West Coast not subject to these issues.

VI. NEW SOURCES OF MID CONTINENT CRUDE OIL TO PADD V

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40. In the 2010-2015 timeframe, U.S. shale crude oil technology matured among U.S. oil producers and opened up significant sources of production in the mid-continent of the U.S. This created a unique opportunity to source crude oil from much more transparent and beneficial sources. However, logistically, the sources of this newly produced domestic supply remained inaccessible to the West Coast refiners via pipeline as that infrastructure does not exist. (*See* Attachment S)

41. Logistics for supplying mid-continent crude to PADD V are currently limited to rail car systems because, as explained above, pipelines across the Rocky Mountains are not under consideration.

42. The development of unit trains and the building of large scale loading facilities opened up a source of supply to West Coast refiners unavailable before. This allowed a flexible new source of supply to access an important new and rapidly growing source of crude oil that was beneficial to the U.S. producers rather than supporting international suppliers in less-than-transparent economies. The Project is a natural extension of the concept to allow the incorporation of this preferred source of crude into our refining system in a way allowing flexibility and reliability. These crude-by-rail projects initially were based on economics of obtaining cost advantaged crude, but quickly demonstrated additional benefits of speed-to-market and flexibility which do not necessarily exist with pipelines.

43. It is also worth noting that the Project essentially utilizes existing infrastructure that is available now to meet current needs rather than developing a new and very long impact footprint which a pipeline would incur. Pipeline projects have long commitment times and investment cycle. Given the definitive near term need and the contested long term demand, this existing and available delivery infrastructure is in many ways preferable to longer term commitment to a single purpose delivery mechanism. The

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Project avoids the duration and impact of not installing a lengthy and large diameter pipeline. Additionally both technologies would require construction of tankage. Pipeline investments also routinely include tankage for ratable operation. Pipeline infrastructure utilizes tanks to manage pipeline volumes. Finally, a facility such as the Project is not exclusively an asset that can only handle petroleum. Other liquid commodities could also utilize the asset with appropriate change-over investment and operations, thus providing commodity flexibility in the future that is different from pipeline infrastructure.

44. The size and capacity of the Project is roughly commensurate to the decline in ANS and CA crude supply, with some additional capacity to address possible fluctuations in rail delivery schedules or marine and vessel loading operations (due to bar closure, for example) and to allow some opportunity to segregate crude oil from different terminal customers.. Even if that were not the case and assuming, hypothetically, consistent production from those sources, the size of the facility would allow domestic source substitution of a significant percentage of the less stable foreign sources upon which refineries currently rely.

45. Based on the analysis described in this testimony, it is my opinion that the Project will not increase petroleum demand. This project is being conducted to manage inputs to the refinery to gain economy of scale to match the Tesoro refining system to allow for accessing domestic crudes from US producers when they are economic, and to provide flexibility of supply in the cases where there are interruptions to supply or market dislocations that create short term impacts and opportunities. The project does not include changes to the refinery throughput or processing and as such does not impact demand which is much more related to Gross Domestic Product growth, vehicle miles travelled, and the constituency of the automobile fleet.

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46. The following documents are attached to my testimony for reference:

Attachment A: Curriculum Vitae of Brad Roach

Attachment B-S *as described above*

[*Signature on Following Page*]

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DATED this 13 day of May, 2016.

Brad Roach

Brad Roach, Declarant

STATE OF TEXAS)
)
COUNTY OF BEXAR)

BRAD ROACH, being duly sworn upon oath, deposes and says: The foregoing testimony is true, correct and complete to the best of my knowledge, information and belief and is given subject to the laws of perjury in the State of Washington.

GIVEN under my hand and official seal this 13 day of May, 2016

Monica L. Moton

NOTARY PUBLIC in and for the State of:

Texas

Residing at: 5106 Hacienda San Antonio 78233

My Commission Expires: January 17, 2020

Printed Name of Notary:

Monica L. Moton

MONICA L. MOTON
Notary Public, State of Texas
My Commission expires
January 17, 2020
ID # 12885272-1
NOTARY PUBLIC STATE OF TEXAS

Van Ness Feldman LLP
719 Second Avenue Suite 1150
Seattle, WA 98104
(206) 623-9372

ATTACHMENT A

F. BRADLY ROACH

111 Aspen Lane
San Antonio, TX 78232
210-394-4151, bbroach@me.com

Education 2012 University of Texas – San Antonio, Masters of Arts, Economics
1980 Texas A&M University, College Station, TX - B. S. Ch. E.

Experience

Tesoro Corporation, Jan 2007 - Present

Senior Economist

Director, Market Analysis (June 2008 – present)

Responsible for overall market analysis supporting Tesoro's downstream refining and marketing operations:

- **Trends Identification and Monitoring** – Scan the development horizon for technologies, trends, and economic impacts relative to the corporation over a multi-decadal time frame

- **Long Term** – Research, develop, and publish a 10 year outlook for the global, domestic, and regional refining industry, including forecast for major economic refining parameters and the Strategic Price Deck based on global/regional/domestic/PADD fundamentals and analysis. This includes analysis of demand trends and underlying drivers, supply increases (refining capacity, utilization, and rationalization), logistics infrastructure changes, assessment of renewable fuels development, specification changes, environmental policy changes, economic activity and other related factors. The long term forecast sets the basis for the budget, the capital planning, all merger and acquisition economics, and the financial forecasts.

- **Short Term** – Provide bi-monthly updates to rolling 4-month projection of prices for use in refinery optimization, crude oil selection, and financial models based on market analysis of supply/demand fundamentals in the supply envelope's of Tesoro's refining and marketing operations. This includes assessing forward markets, changes in near term demand and refinery utilization, renewable fuels markets, and other econometric influences. Brief the Executive Committee (CEO and direct reports) monthly regarding changing market conditions.

- **Innovation Development** – Originate, evaluate, and develop innovations suitable for application in the downstream refining, distribution, and marketing industry

Also included are ad hoc and special assignments:
Intensive study of Asia markets (including onsite 6 weeks in Singapore)
Intensive study of Latin American markets
Intensive assessment of US PADD 5 markets
Additional confidential intensive market analyses supporting M&A activity (including foreign assignments)
Assessment of crude oil production changes on North America crude oil structure

Additional Focus and Responsibilities:
Speech writing for CEO for domestic and international engagements
Development and incorporation of Monte Carlo risk assessments in forecasts and economic analysis
Market analysis of renewable fuels markets and economics of proposed legislation on domestic and foreign markets (e.g. Brazil)
Market assessments of renewable fuels and associated regulations (LCFS/RFS)
Economic modeling using advanced Excel tools (LP add-ins e.g. Premium Solver) and Crystal Ball Monte Carlo simulations
Supervise staff of 10 analysts to support short term, long term, competitor, and ad hoc economic analysis
Support investor relations on broker visits

Manage major portion of Strategy & Business Development controllable expenses

Director, Economics and Strategy (Jan 2007 – June, 2008)
Responsible for developing economic assessment of potential opportunities and challenges to Tesoro's ongoing operation including:

Biofuel outlook – became in-house resource for ethanol industry economics and outlook
Gulf Coast Crude Oil Production - assess the long-term trend for Gulf Coast deep-water production and the impact on Gulf Coast crude margins
Alternative Vehicle Technologies Development -– Assess the impact of alternative vehicles on U.S. and regional demand for light fuels.

DTN, Omaha, NE, Oct 2006- Dec 2006
Transition position working with DTN on electronic data and news services (outgrowth of CITGO experience)

CITGO Petroleum, July 1985- Sept 2006
Houston/Tulsa Headquarters Jan 1994 – Sept 2006
Acting –Manager of Pricing – CITGO Light Oils (Houston)
Manage staff of 15 during transition from Tulsa to Houston; function as department manager in Houston office
- Market analysis supporting CITGO's 10 Billion Gallons/Yr of Light Oil Fuels Products
- Develop strategy and negotiations for high volume accounts
- Decision accountability for pursuing business opportunities in Light Oils Marketing
- Coordinate all phases of the relocation of headquarters (timing/staffing/recruiting/job transfers)

Manager of Gasoline and Distillate Pricing, Southern Region (Tulsa) June 2003 – Jan 2005
Manage staff of 9 in evaluate market conditions and establishing price for 6 Billion Gal/Yr of Light Oil Fuels
- Develop strategy and negotiations for high volume accounts
- Develop formula based pricing, marketing strategy, evaluation of opportunities and business development. Continued responsibilities for demand planning and allocation systems (previous responsibilities; national coverage). Initiated and/or developed Marketing projects which include:
- **MarginNet** –CITGO's margin support program for CITGO retailers.
- **Automated Delivery Reconciliation -** Internet based system of confirming fuel deliveries
- **Ratability Monitoring System**

Marketing Quantitative Systems Manager (Tulsa), Jan 1998 – June 2003
- Implementation and operation of third party forecasting system (Logility) for CITGO's fuels products; including project development, training, implementation and maintenance of the statistically based forecasting system. Integration of forecasting and allocations systems into SAP.
- Supply Chain Team – Inventory Optimization Analysis based on statistical techniques
- Highly rated speaker in public seminar presentations regarding forecasting:

Refining Economics and Coordination (Tulsa) Aug, 1996-Jan, 1998
- Economic analysis, optimization, and coordination for CITGO's Corpus Christi Refinery. Optimization of refinery, feedstock selection, crude evaluation for spot crude opportunities, refinery LP models maintenance and use, margin analysis, and corporate logistics interface.

Business Economics and Analysis Manager (Tulsa) Jan, 1994-Aug, 1996

CITGO/Champlin Corpus Christi Refinery, July 1985 – Dec 1993
Senior Economic Analyst Nov, 1992 - Dec, 1993
Quality Improvement Coordinator May 1991 - Nov, 1992
Petrochemical Coordinator April, 1989 - April, 1991
Operations Engineer May, 1987 - March, 1989

Process Engineer (Fluid Catalytic Cracker Units) July, 1985 - May, 1987

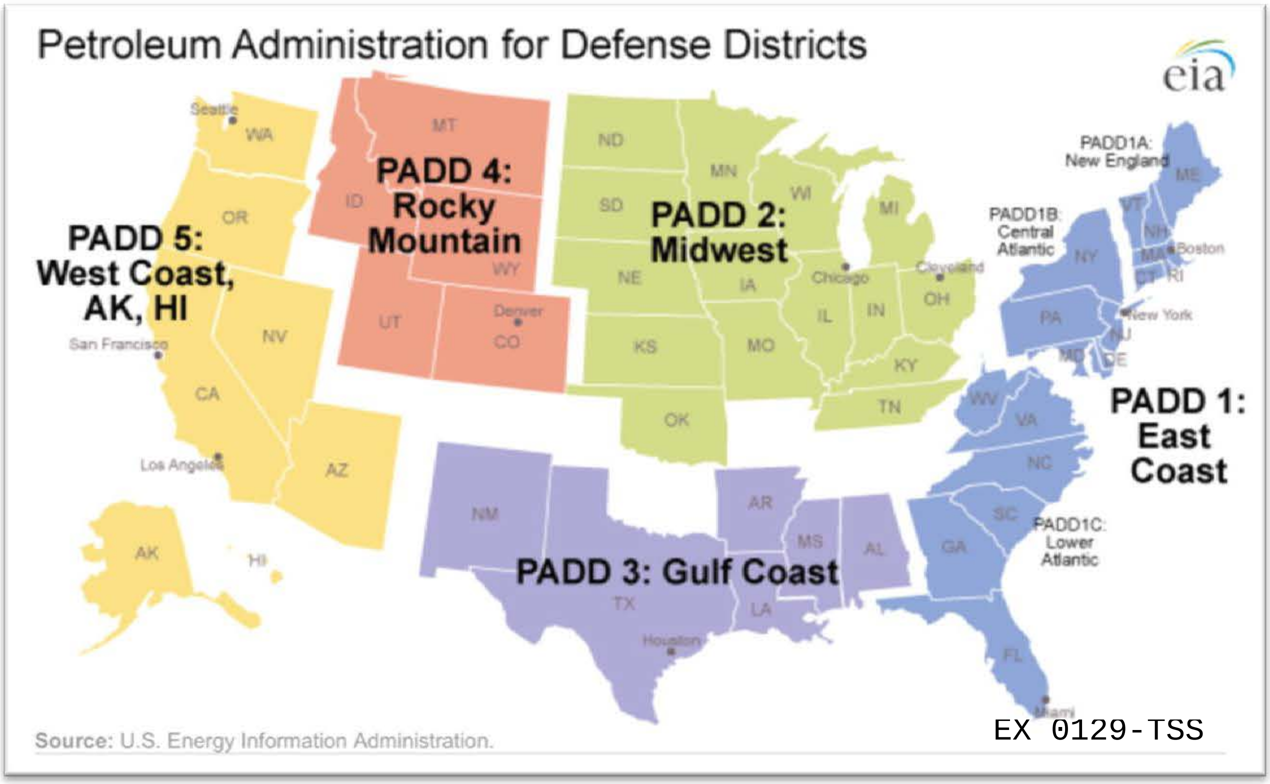
Celanese Chemical Research Center, Corpus Christi, TX, August 1984 - July 1985

Development Engineer Assessment of technical and economic feasibility of blending alcohols into motor gasoline.

Coastal States, Corpus Christi, TX, Oct 1980 - June 1984

Senior Process Engineer/Process Engineer

ATTACHMENT B



Petroleum Administration for Defense Districts
eia
PADD 5: West Coast, AK, HI
PADD 4: Rocky Mountain
PADD 2: Midwest
PADD 3: Gulf Coast
PADD 1: East Coast
PADD1A: New England
PADD1B: Central Atlantic
PADD1C: Lower Atlantic
WA
OR
CA
NV
AZ
AK
HI
ID
MT
WY
UT
CO
NM
TX
OK
ND
SD
NE
KS
MN
IA
MO
WI
IL
IN
MI
OH
KY
TN
AR
LA
MS
AL
ME
VT
NH
MA
RI
CT
NY
PA
NJ
DE
MD
WV
VA
NC
SC
GA
FL
Seattle
San Francisco
Los Angeles
Denver
Houston
Chicago
Cleveland
Boston
New York
Miami
Source: U.S. Energy Information Administration.

EX 0129-TSS

ATTACHMENT C

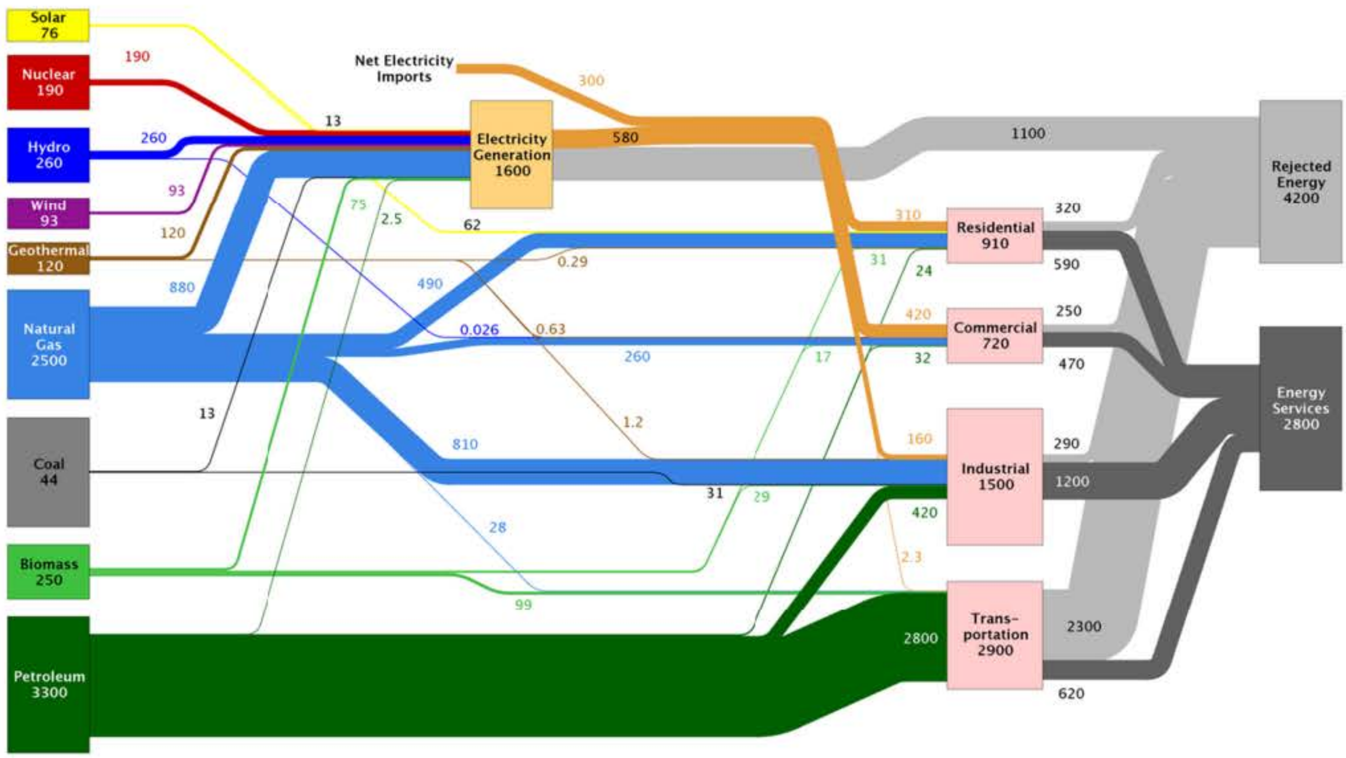

CAPP
CANADIAN ASSOCIATION
OF PETROLEUM PRODUCERS
PADD V
PADD IV
PADD II
PADD III
PADD I
Canadian and U.S. Crude Oil
Pipelines and Refineries
PADD
CLICK TO ENLARGE

EX 0130-TSS

ATTACHMENT D

Estimated California Energy Use In 2012
~7100 Trillion BTU

Lawrence Livermore National Laboratory

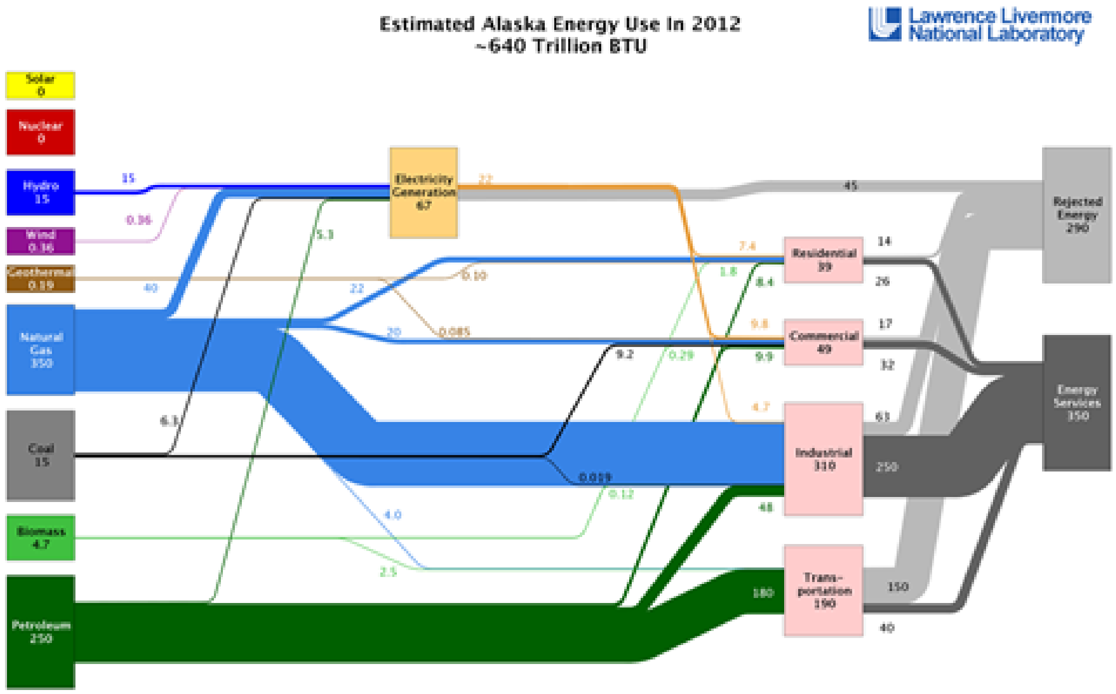


Source: LLNL 2013. Data is based on DOE/EIA-0214(2011), June 2013. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. Interstate and international electricity trade are lumped into net imports or exports and are calculated using a system-wide generation efficiency. End use efficiency is estimated for each sector as 65% residential, 65% commercial, 80% industrial and 21% transportation. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

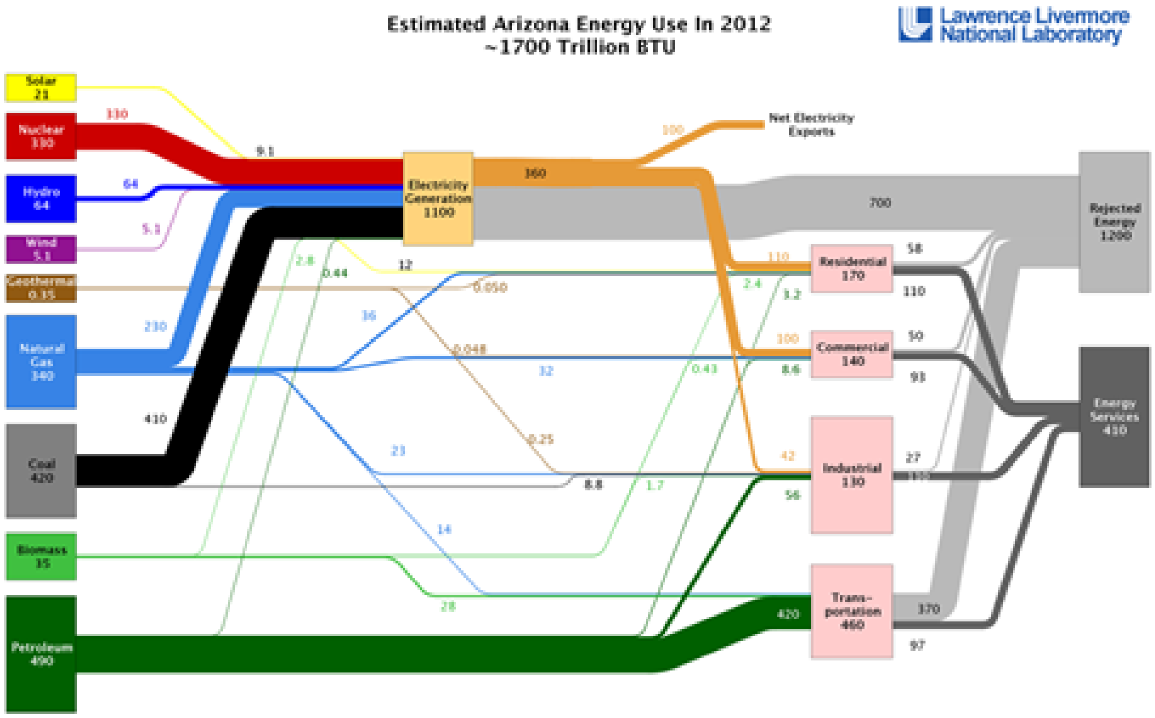
EX 0131-TSS

ATTACHMENT D1

Estimated Alaska Energy Use In 2012
~640 Trillion BTU

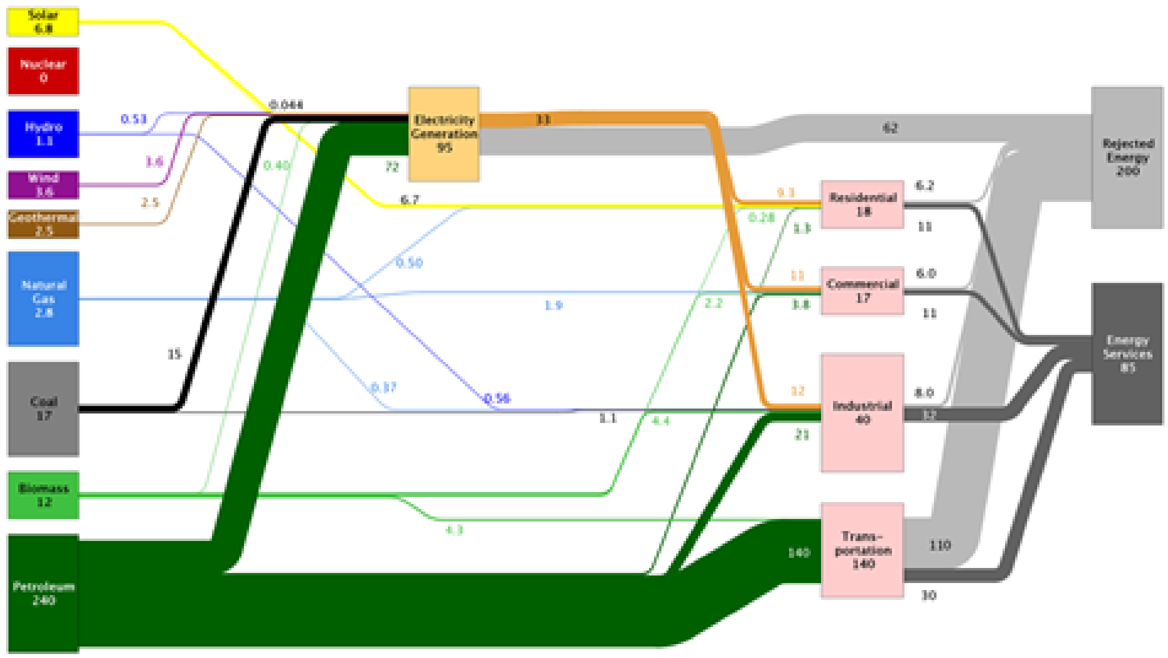


ATTACHMENT D 2


Estimated Arizona Energy Use In 2012
~1700 Trillion BTU
Lawrence Livermore National Laboratory
Solar 21
Nuclear 330
Hydro 64
Wind 5.1
Geothermal 0.35
Natural Gas 340
Coal 420
Biomass 35
Petroleum 490
Electricity Generation 1100
Net Electricity Exports
Residential 170
Commercial 140
Industrial 130
Trans-portation 460
Rejected Energy 1200
Energy Services 410
330
64
5.1
9.1
230
410
2.8
0.44
12
360
100
700
110
100
42
420
36
0.050
0.048
32
23
0.25
8.8
14
28
2.4
3.2
0.43
8.6
1.7
56
58
110
50
93
27
370
97

ATTACHMENT D 3

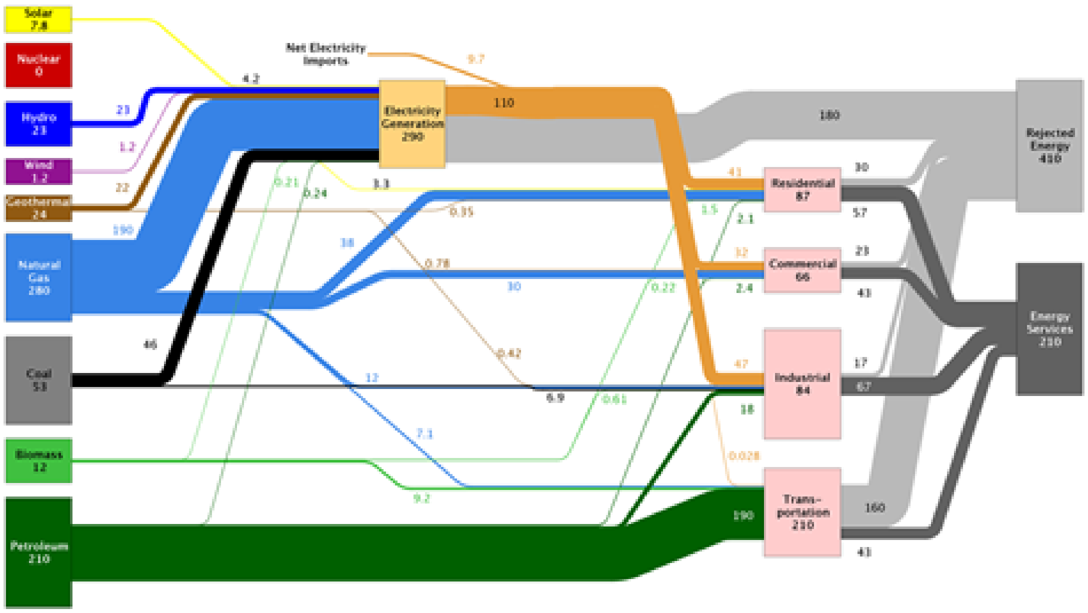
Estimated Hawaii Energy Use In 2012
~280 Trillion BTU



ATTACHMENT D 4

Estimated Nevada Energy Use in 2012
~620 Trillion BTU

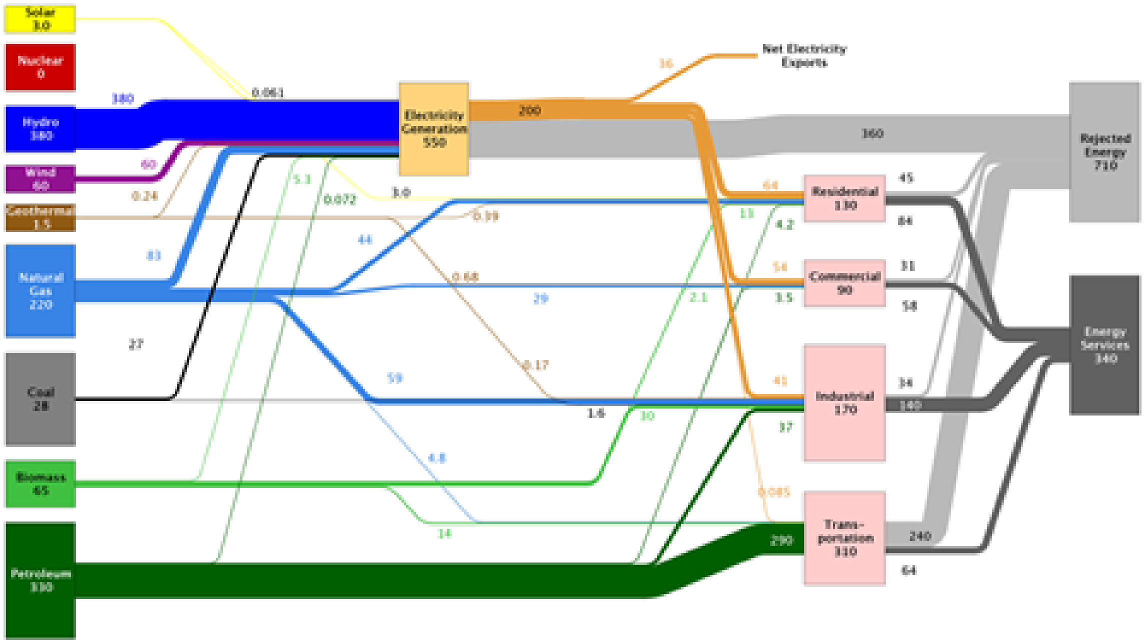
Lawrence Livermore National Laboratory



Source: LLNL 2013. Data is based on DOE/EIA-0214(2011), June 2013. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. Interstate and international electricity trade are lumped into net imports or exports and are calculated using a system-wide generation efficiency. End use efficiency is estimated for each sector as 65% residential, 65% commercial, 80% industrial and 21% transportation. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

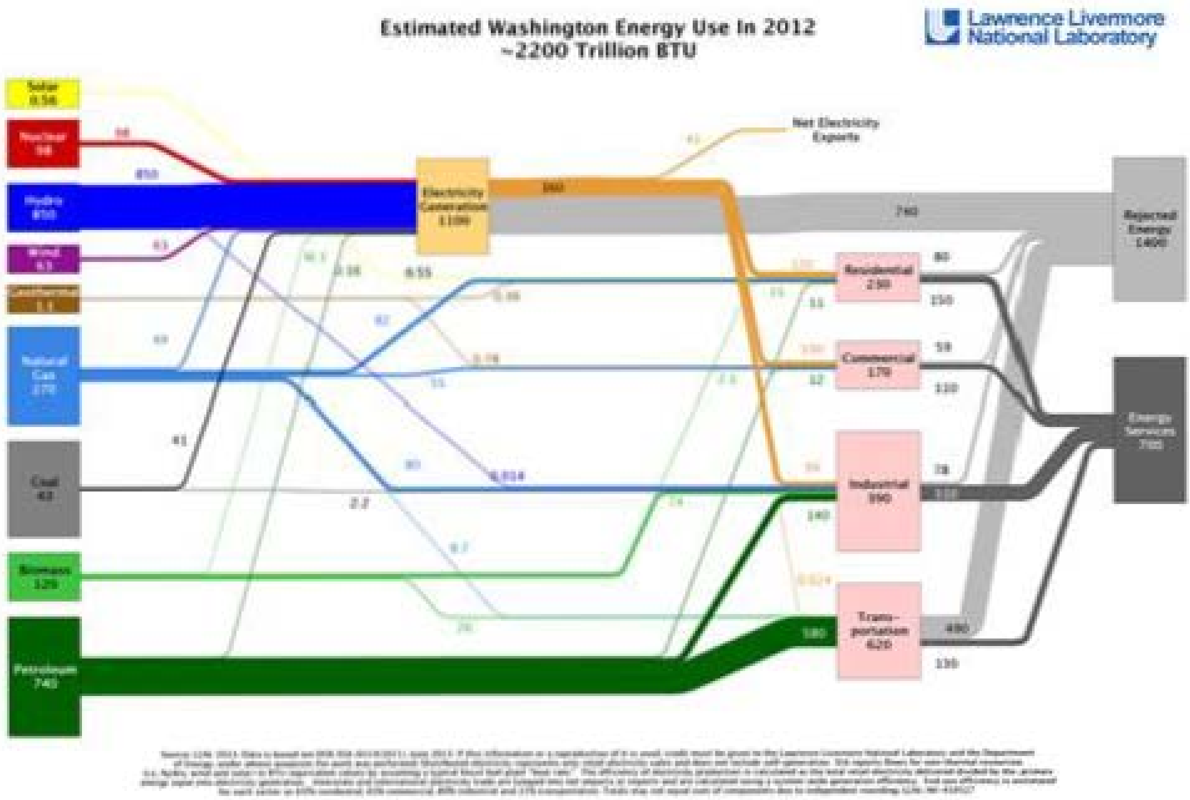
ATTACHMENT D 5

Estimated Oregon Energy Use In 2012
~1100 Trillion BTU

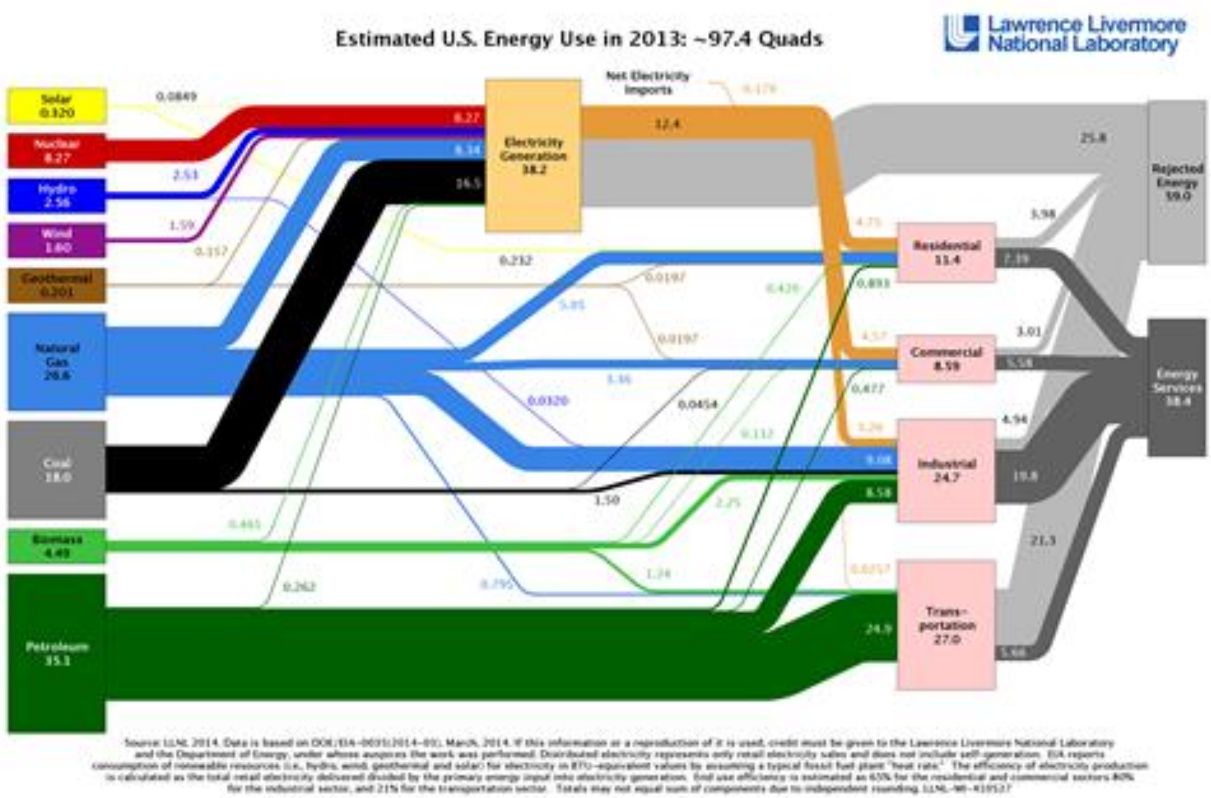


Source: LLNL 2013. Data is based on DOE/EIA-0214(2011), June 2013. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. Interstate and international electricity trade are lumped into net imports or exports and are calculated using a system-wide generation efficiency. End use efficiency is estimated for each sector as 65% residential, 65% commercial, 80% industrial and 21% transportation. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

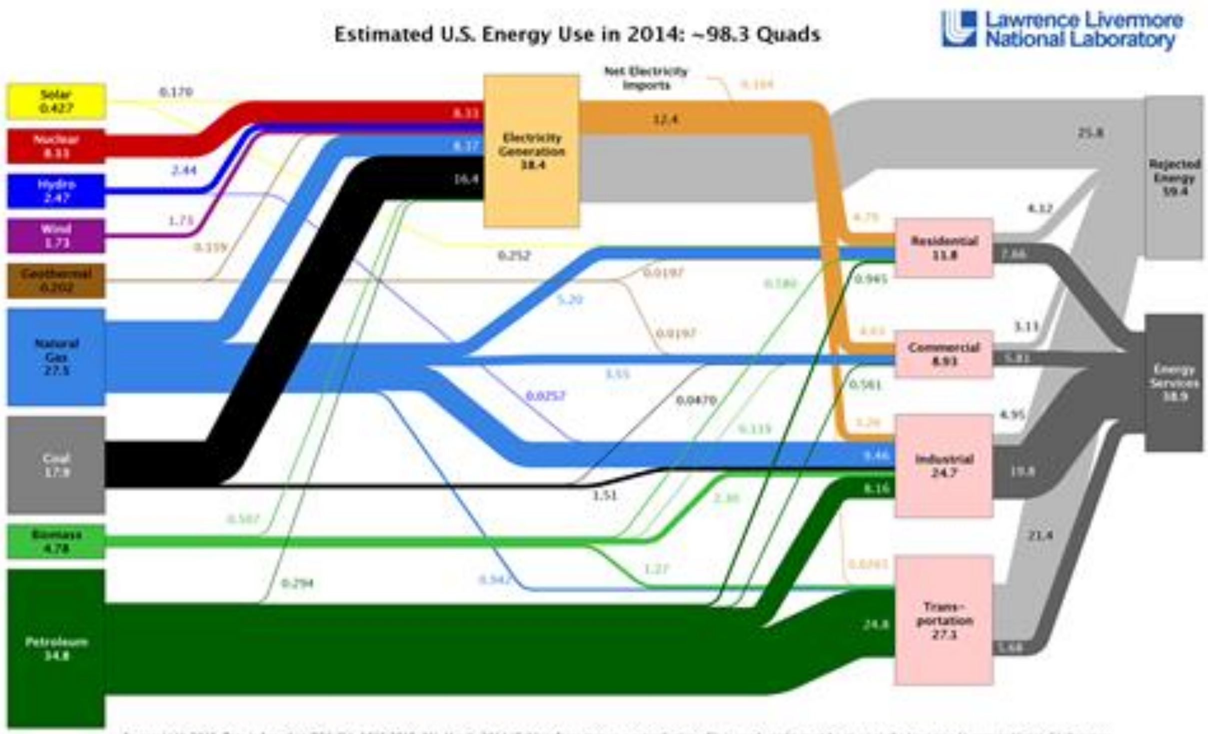
ATTACHMENT D 6


Estimated Washington Energy Use In 2012
~2200 Trillion BTU
Lawrence Livermore National Laboratory
Solar 0.56
Nuclear 98
Hydro 850
Wind 63
Geothermal
Natural Gas 270
Coal 43
Biomass 120
Petroleum 740
Electricity Generation 1100
Net Electricity Exports
Rejected Energy 1400
Energy Services 790
Residential 230
Commercial 170
Industrial 390
Trans-portation 620
740
580
490

ATTACHMENT D 7


Estimated U.S. Energy Use in 2013: ~97.4 Quads
Lawrence Livermore National Laboratory
Solar 0.320
Nuclear 8.27
Hydro 2.56
Wind 1.60
Geothermal 0.201
Natural Gas 26.6
Coal 18.0
Biomass 4.49
Petroleum 35.1
Electricity Generation 38.2
Net Electricity Imports
12.4
Residential 11.4
Commercial 8.59
Industrial 24.7
Trans-portation 27.0
Rejected Energy 59.0
Energy Services 38.4
25.8
3.98
3.01
4.94
21.3
19.8
24.9
8.58
0.232
1.50
0.0454
0.262
0.0849
2.53
1.59
0.157
8.27
16.5
0.0197
0.0197
0.893
0.477
0.0320

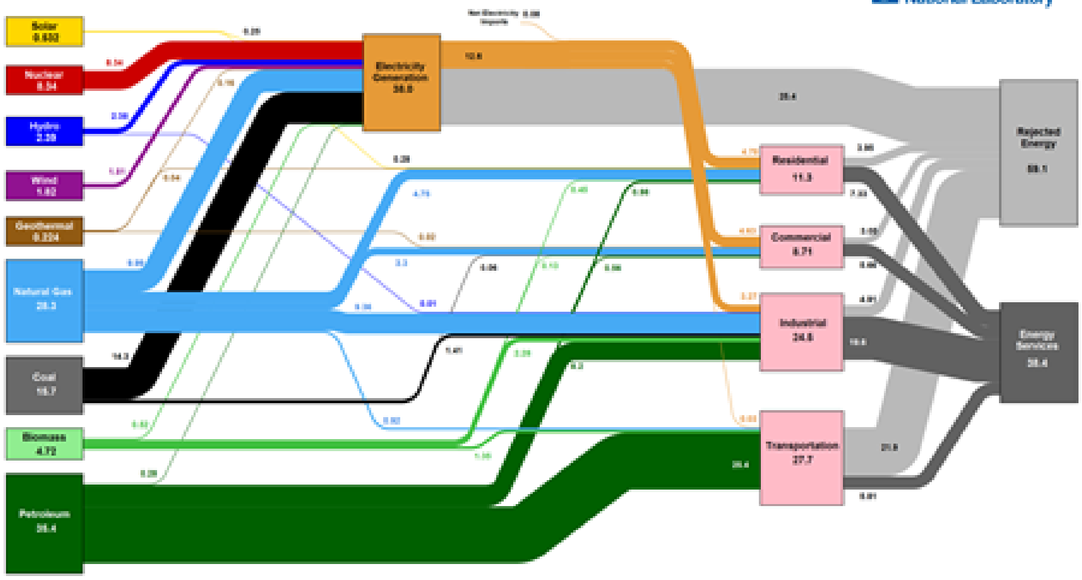
ATTACHMENT D 8



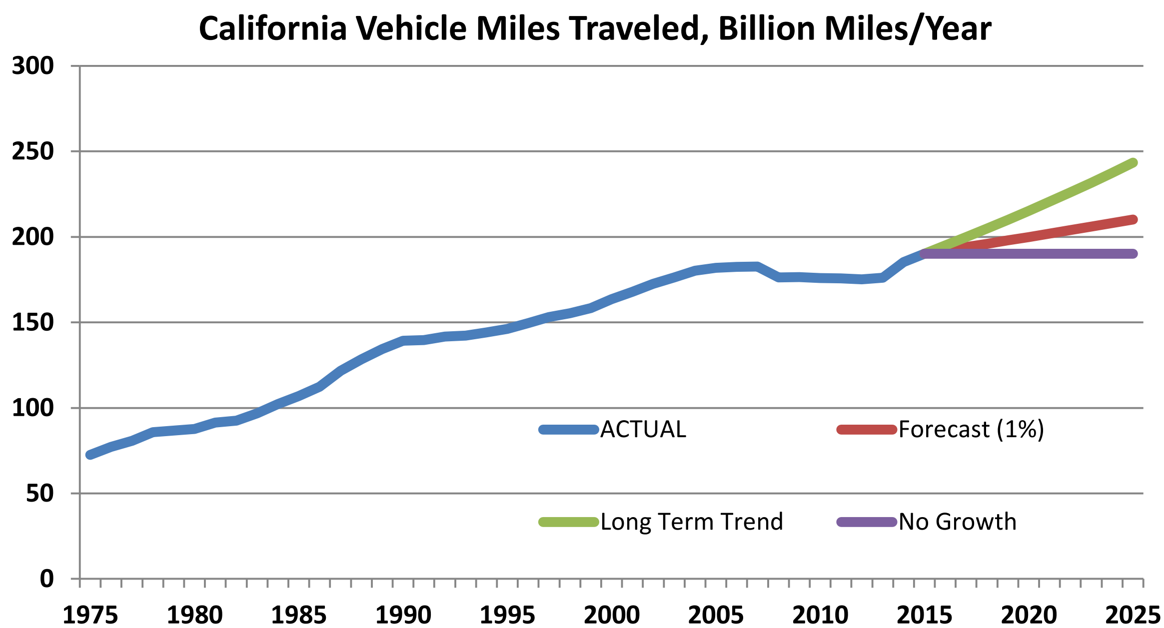
Source: LLNL 2015. Data is based on DOE/EIA-0035(2015-03), March, 2014. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential and commercial sectors 80% for the industrial sector, and 21% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

ATTACHMENT D 9

Estimated U.S. Energy Consumption in 2015: 97.5 Quads

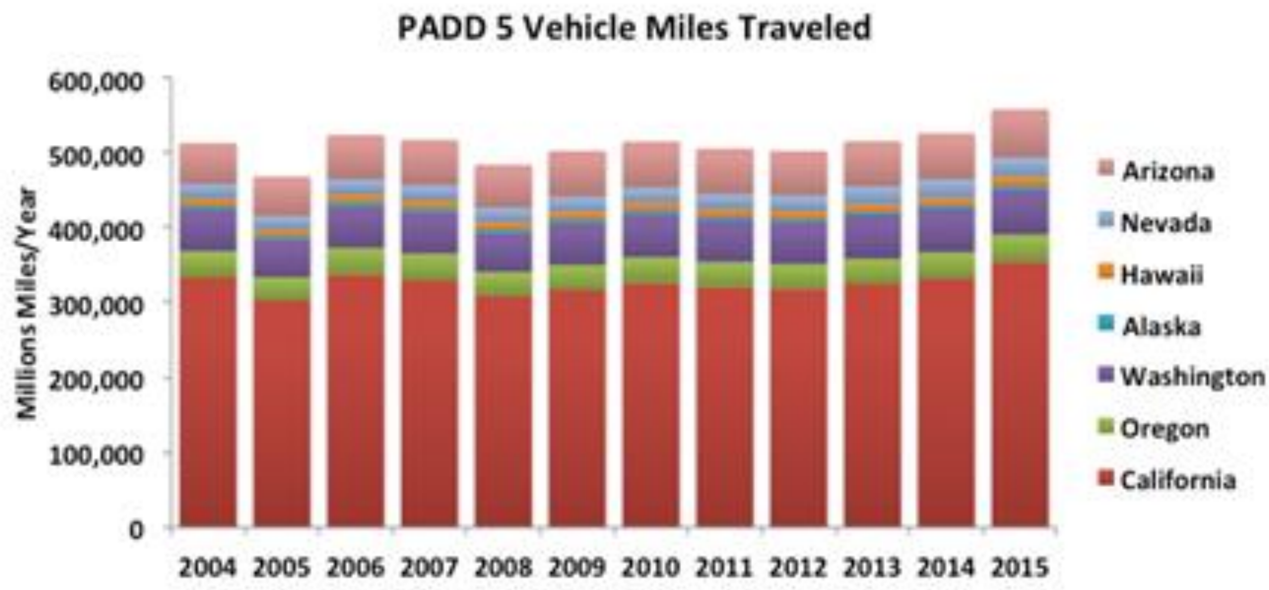


ATTACHMENT E


California Vehicle Miles Traveled, Billion Miles/Year
300
250
200
150
100
50
0
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
ACTUAL
Forecast (1%)
Long Term Trend
No Growth

EX 0132-TSS

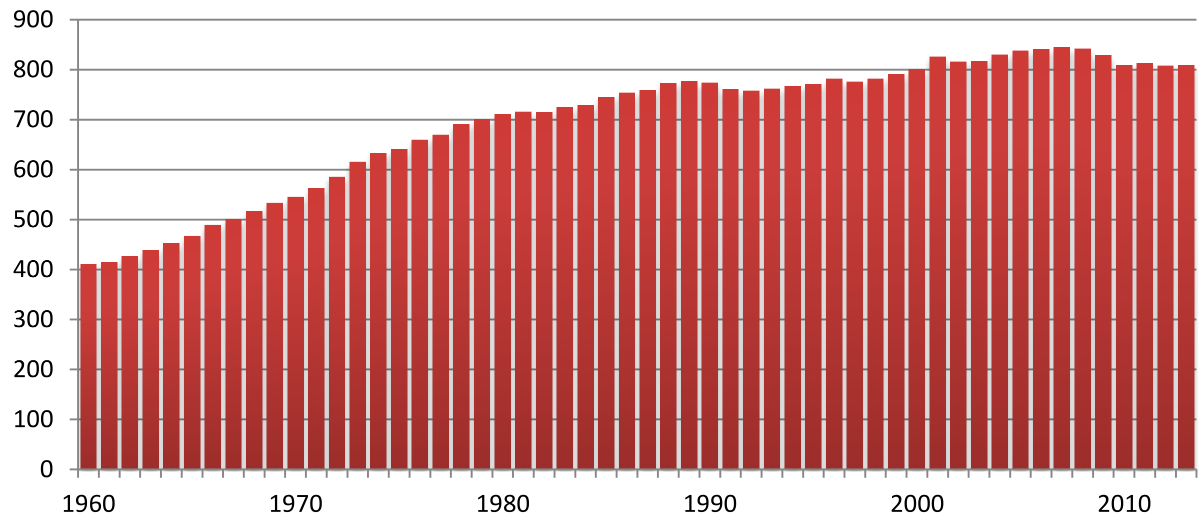
ATTACHMENT F


PADD 5 Vehicle Miles Traveled
Millions Miles/Year
600,000
500,000
400,000
300,000
200,000
100,000
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Arizona
Nevada
Hawaii
Alaska
Washington
Oregon
California

EX 0133-TSS

ATTACHMENT G

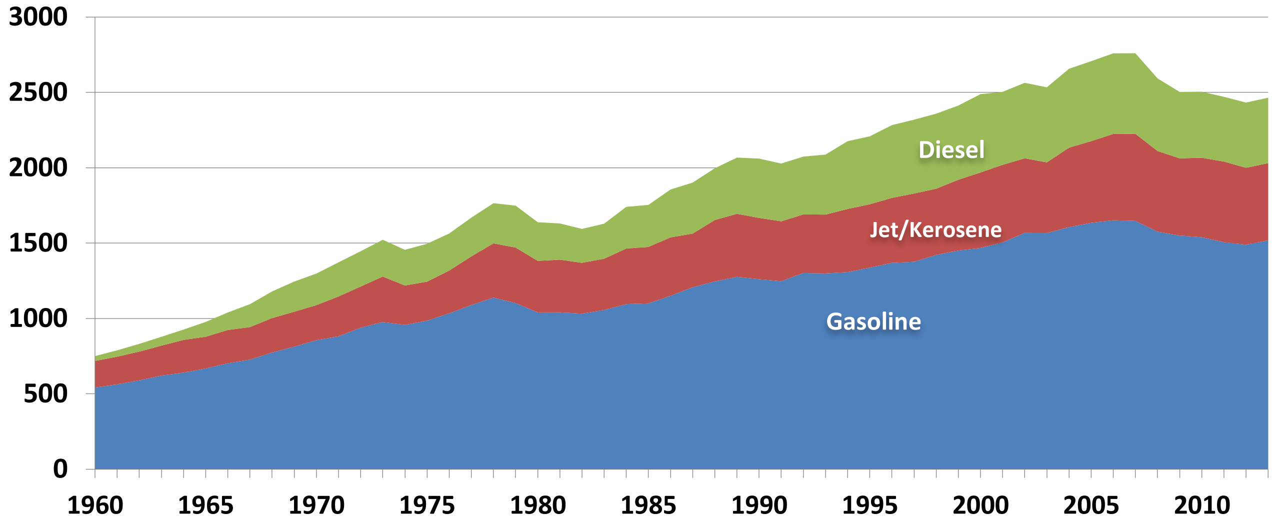
Vehicles Per 1000 People - US



EX 0134-TSS

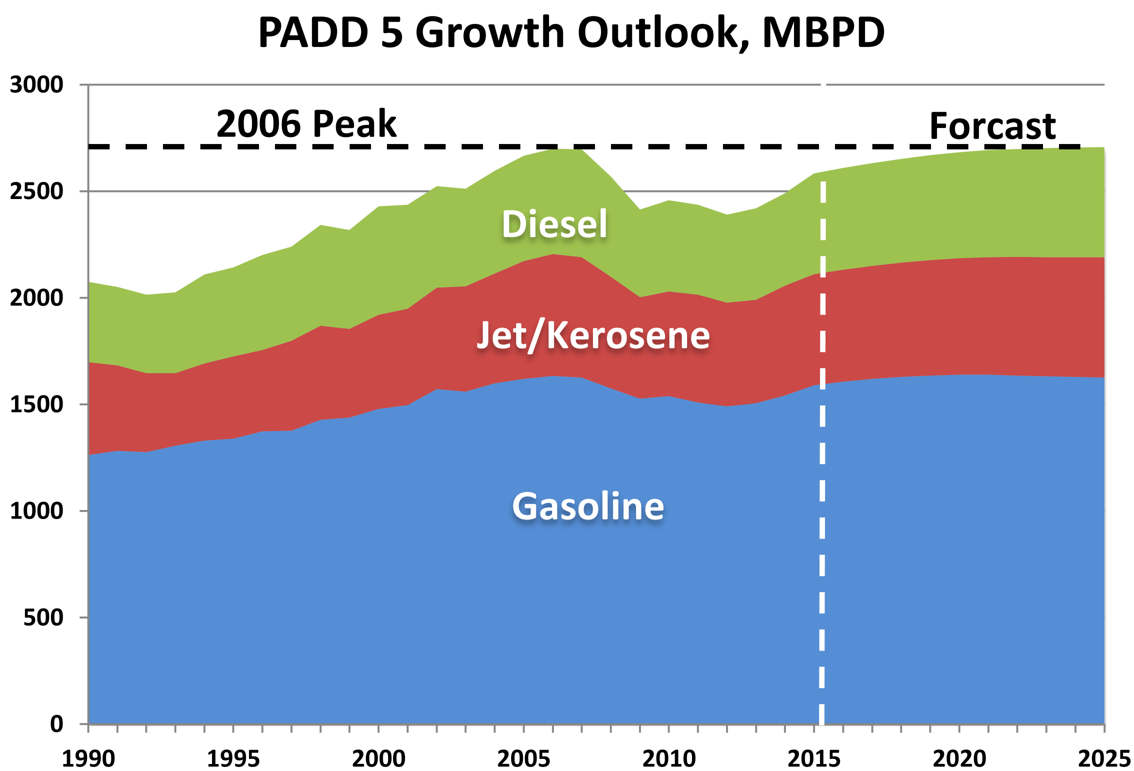
ATTACHMENT H

Western US (PADD 5) Transporation Fuel Demand, MBPD



EX 0135-TSS

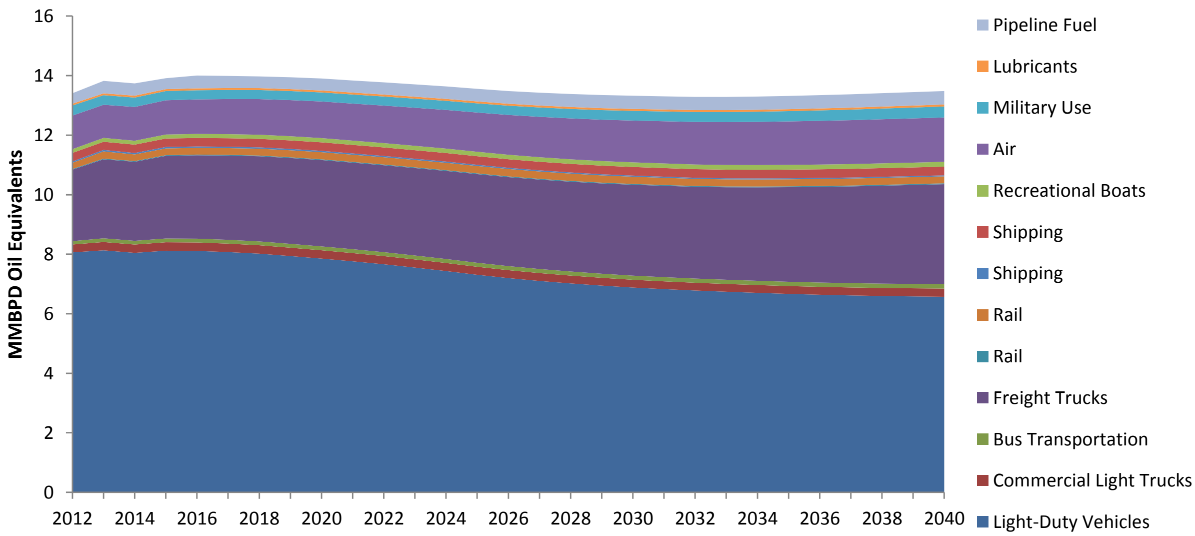
ATTACHMENT I


PADD 5 Growth Outlook, MBPD
3000
2500
2000
1500
1000
500
0
2006 Peak
Forcast
Diesel
Jet/Kerosene
Gasoline
1990
1995
2000
2005
2010
2015
2020
2025

EX 0136-TSS

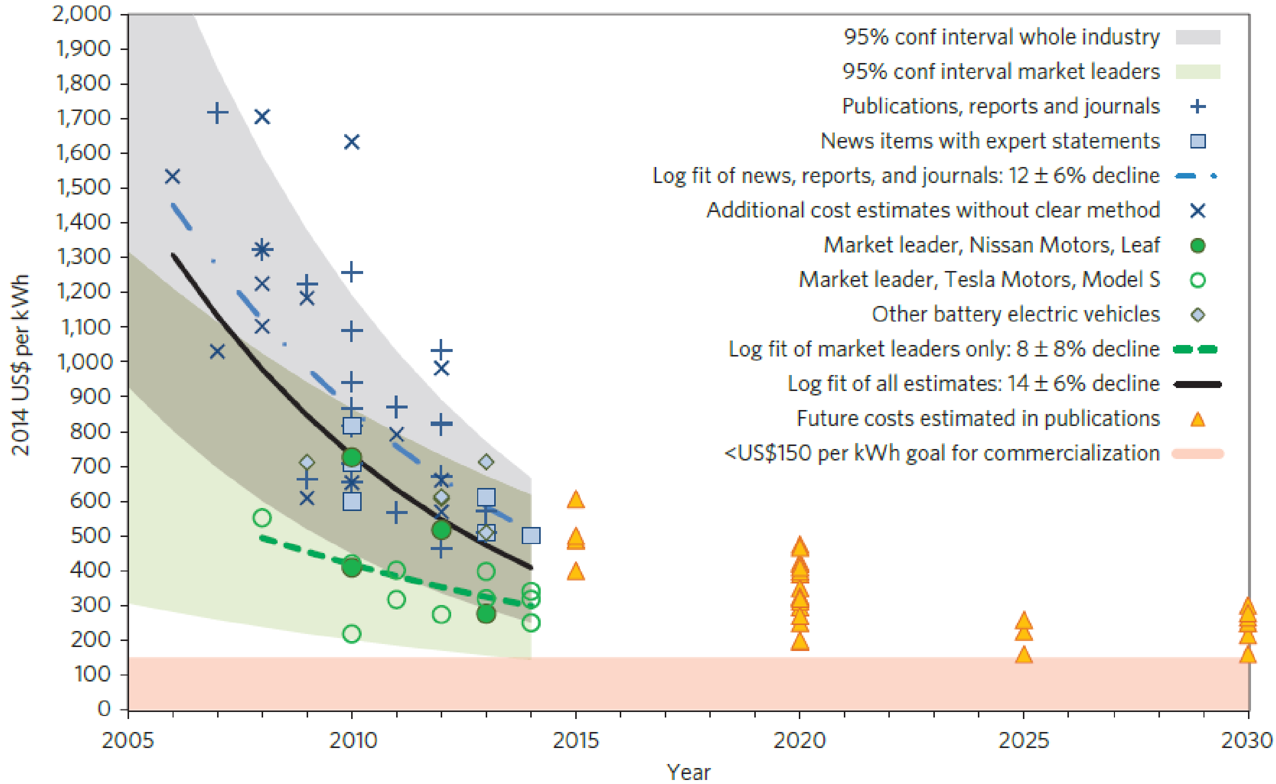
ATTACHMENT J

U.S. Transportation Sector Energy Demand, Oil Equivalents



EX 0137-TSS

ATTACHMENT K



From

Rapidly falling costs of battery packs for electric vehicles

Björn Nykvist & **Måns Nilsson**

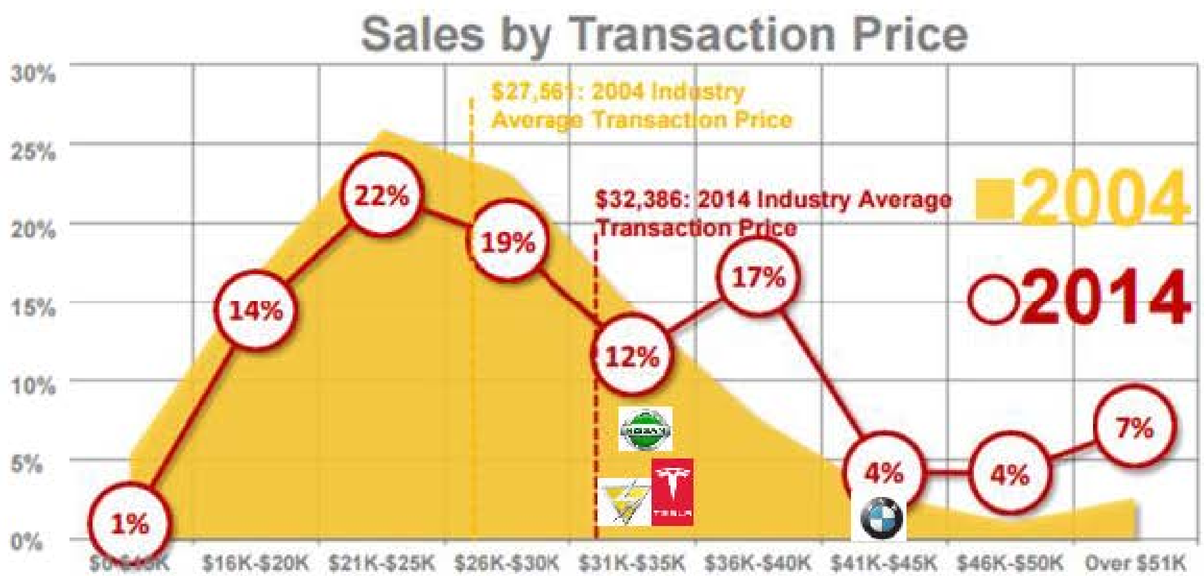
Nature Climate Change **5**, 329–332 (2015) | doi:10.1038/nclimate2564

Received 17 October 2014 | Accepted 09 February 2015 | Published online 23 March 2015

MIT EmTech-2015

EX 0138-TSS

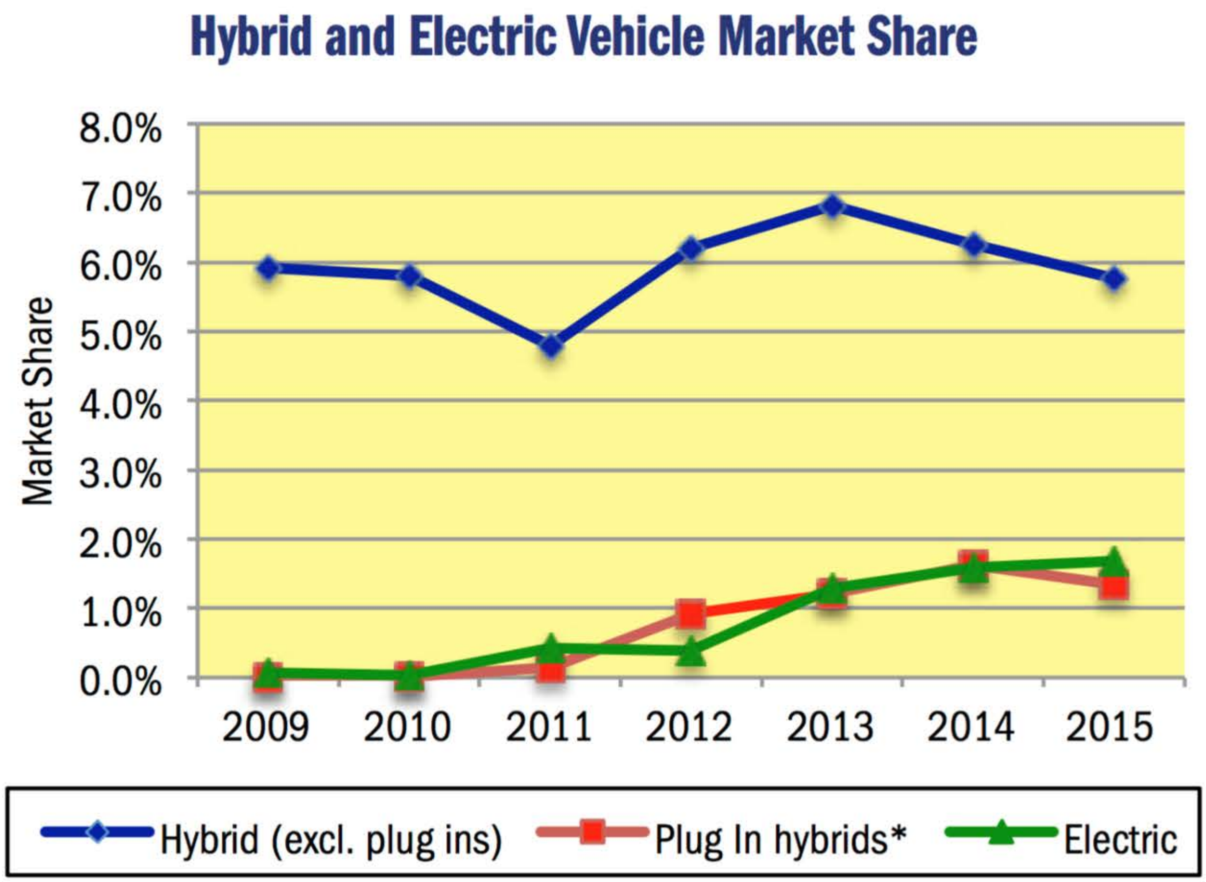
ATTACHMENT L



Sales by Transaction Price
30%
25%
20%
15%
10%
5%
0%
$27,561: 2004 Industry Average Transaction Price
$32,386: 2014 Industry Average Transaction Price
2004
2014
22%
19%
14%
12%
17%
1%
4%
4%
7%
$16K-$20K
$21K-$25K
$26K-$30K
$31K-$35K
$36K-$40K
$41K-$45K
$46K-$50K
Over $51K

EX 0139-TSS

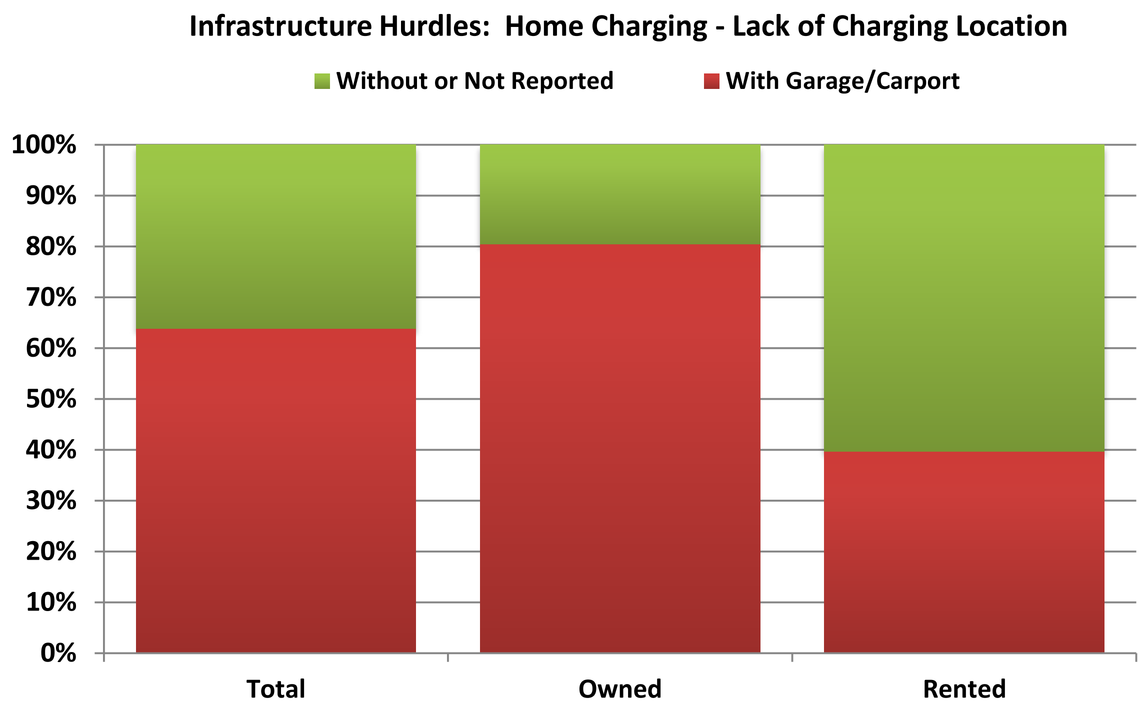
ATTACHMENT M



Hybrid and Electric Vehicle Market Share
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
Market Share
2009
2010
2011
2012
2013
2014
2015
Hybrid (excl. plug ins)
Plug In hybrids*
Electric

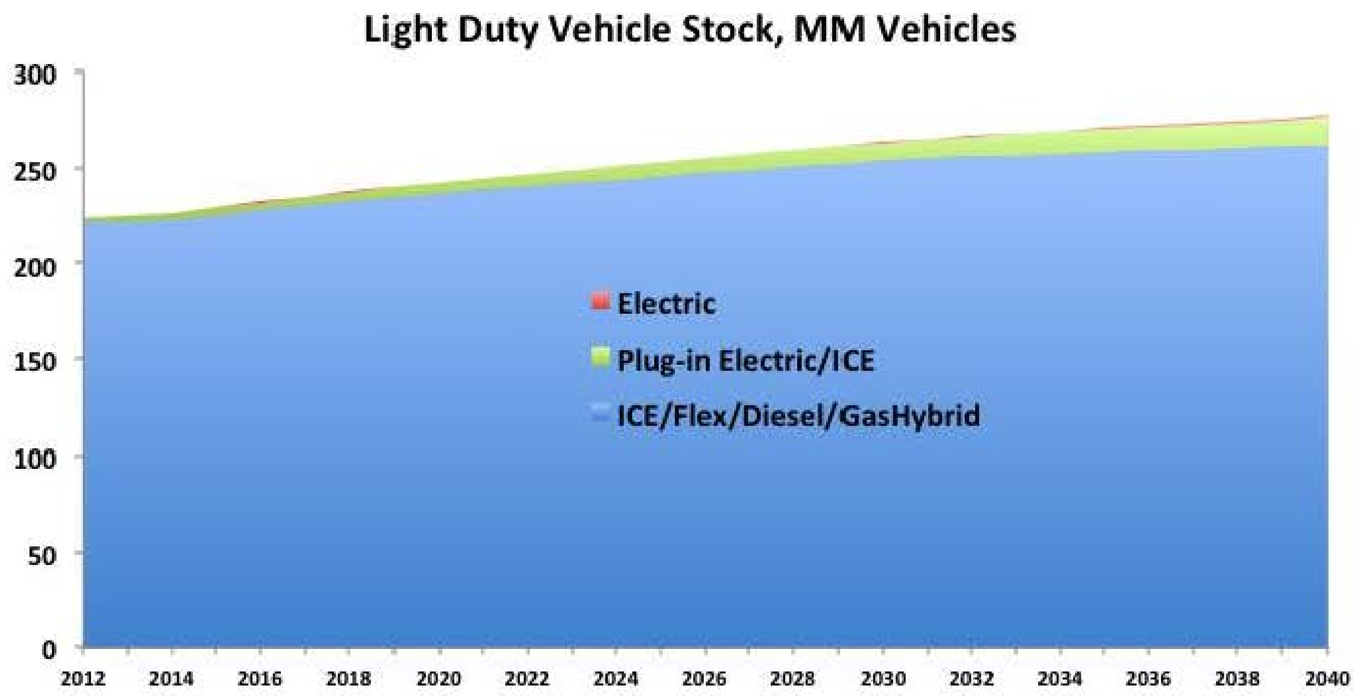
EX 0140-TSS

ATTACHMENT N


Infrastructure Hurdles: Home Charging - Lack of Charging Location
Without or Not Reported
With Garage/Carport
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Total
Owned
Rented

EX 0141-TSS

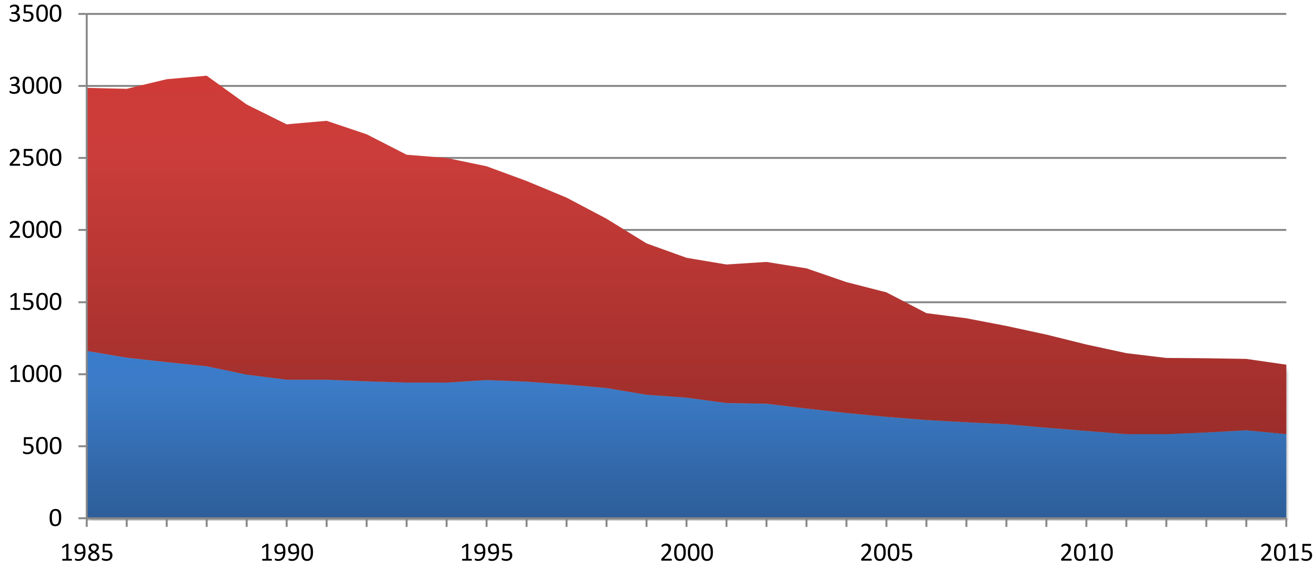
ATTACHMENT O


Light Duty Vehicle Stock, MM Vehicles
300
250
200
150
100
50
0
Electric
Plug-in Electric/ICE
ICE/Flex/Diesel/GasHybrid
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040

EX 0142-TSS

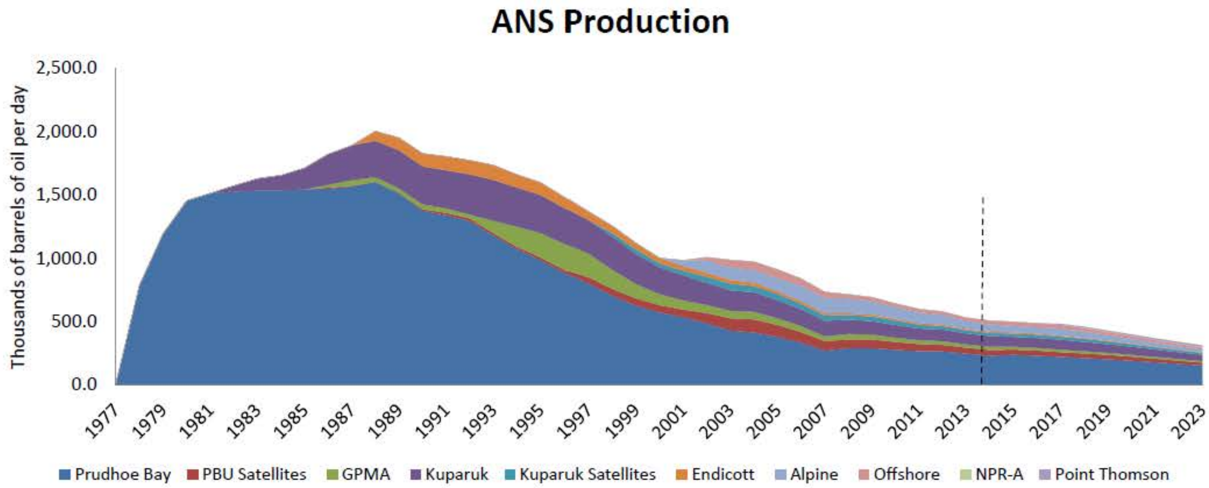
ATTACHMENT P

California and Alaska Crude Oil Production, MBPD



EX 0143-TSS

ATTACHMENT Q



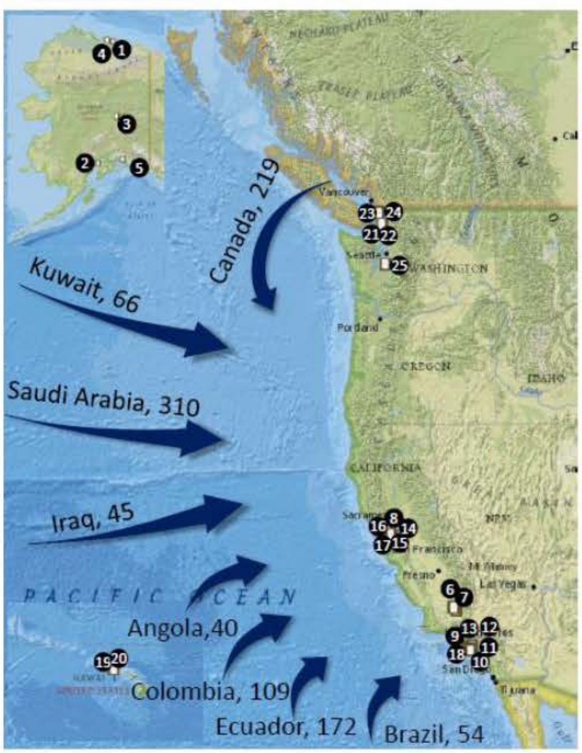
(thousands of barrels per day)

FY	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Spring 2016 Forecast										
Alaska North Slope	517.7	507.1	488.8	484.4	454.1	418.6	387.1	356.8	327.0	300.5
Non-North Slope	17.3	16.1	14.7	13.5	12.5	11.7	10.9	10.2	9.6	9.0
Total	**535.0**	**523.2**	**503.5**	**498.0**	**466.7**	**430.2**	**397.9**	**366.9**	**336.5**	**309.5**

WC Refining System

Forecast as of March 7th, 2016

TESORO



2015 Crude Imports = 1,138 MBPD
Top 90% of Origins

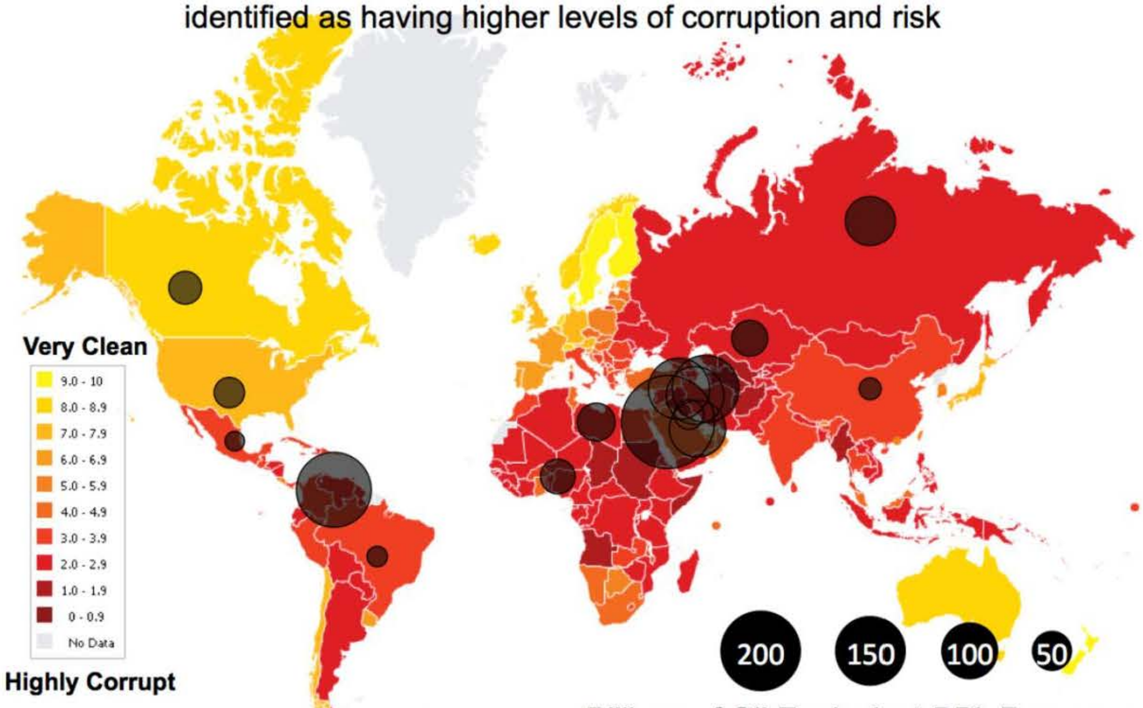
#	State	City	Company	Capacity, MBPD	
1	AK	Prudhoe Bay	ConocoPhillips	15	AK 165
2	AK	Nikiski	Tesoro	65	
3	AK	North Pole	Petro Star Inc.	20	
4	AK	Prudhoe Bay	BP	11	
5	AK	Valdez	Petro Star Inc.	55	
6	CA	Bakersfield	Kern Oil	26	CA 1872
7	CA	Bakersfield	San Joaquin Refining	15	
8	CA	Benicia	Valero	145	
9	CA	Carson	Tesoro	257	
10	CA	El Segundo	Chevron	269	
11	CA	Los Angeles	Phillips 66 Co.	139	
12	CA	Los Angeles	Tesoro	104	
13	CA	Los Angeles	Valero	79	
14	CA	Martinez	Shell Oil Products USA	156	
15	CA	Martinez	Tesoro	166	
16	CA	Richmond	Chevron	245	
17	CA	Rodeo	Phillips 66 Co.	120	
18	CA	Torrance	ExxonMobil	150	
19	HI	Ewa Beach	Chevron	54	HI 148
20	HI	Ewa Beach	Par Petroleum	94	
21	WA	Anacortes	Shell Oil Products USA	145	WA 632
22	WA	Anacortes	Tesoro	120	
23	WA	Ferndale	BP	225	
24	WA	Ferndale	Phillips 66 Co.	101	
25	WA	Tacoma	TrailStone Group	41	

20

EX 0144-TSS

ATTACHMENT R

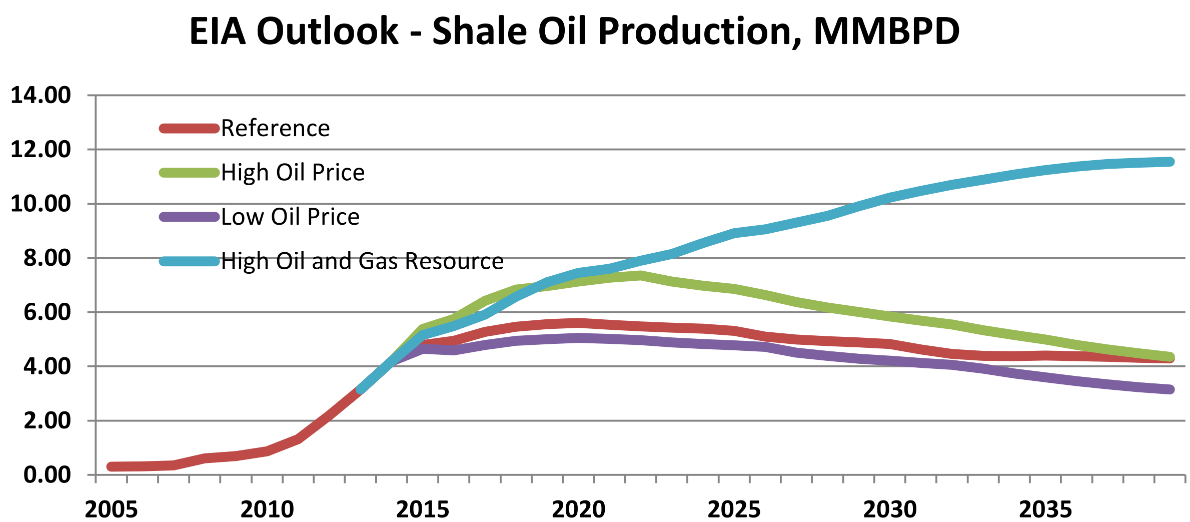
Global Crude Oil Reserves are largely in regions identified as having higher levels of corruption and risk



Source: Transparency International/BP Data Book

EX 0145-TSS

ATTACHMENT S


EIA Outlook - Shale Oil Production, MMBPD
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
2005
2010
2015
2020
2025
2030
2035
Reference
High Oil Price
Low Oil Price
High Oil and Gas Resource

EX 0146-TSS