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DOCKET

10-ALT-01

DATE Mar 25 2011

RECD. Mar 25 2011

Catherine H. Reheis-Boyd

President

March 25, 2011

California Energy Commission

Dockets Office, MS-4

Re: Docket No. 10-ALT-1

1516 Ninth Street

Sacramento, CA 95814-5512

Re: 2011-2012 Advisory Committee Meeting for the Alternative and Renewable Fuel and Vehicle Technology Program – Docket No. 10-ALT-1

Dear Docket:

This letter contains the Western States Petroleum Association's (WSPA) written comments on the March 7 meeting of the Advisory Committee for the 2010-2011 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program. WSPA is a non-profit trade association representing twenty-six member companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California and five other western states.

WSPA has participated in reviewing past AB118 Investment Plans, and has historically submitted testimony and comments. We recognize that the March 7 meeting was designed to receive input from the Advisory Committee, stakeholders and the public regarding the analyses and recommendations contained in the draft plan. We were only able to electronically attend the meeting for a brief period of time.

Overall, we believe it is very important that the state selects appropriate ways to spend approximately \$100 million of the state's consumer's money. We also believe that the ambitious state goals regarding greenhouse gas reduction need to be balanced with a realistic understanding of the transportation (both vehicle and fuel) system in order to allocate the funds wisely.

On a related note, we were dismayed to see in the Executive Summary, page 3, the statement that, "Auto manufacturers, utilities, other stakeholders, and federal and local governments are investing in alternative fuel and advanced vehicle technologies." It appears the petroleum industry is once again being ignored relative to accolades for alternative fuel development.

WSPA has attached one of our papers that highlights just a few of the alternative/renewable fuels activities in which our members are involved. The material reflects only publicly available information, so it represents only a fraction of what the petroleum industry is doing to advance alternative and renewable fuels throughout the world.

Also, a recent (January 26, 2011) American Petroleum Institute (API) paper on "Energizing America: Facts for Addressing Energy Policy" states, "The oil and natural gas industry is hard at work meeting today's energy needs and developing next-generation forms of energy. Between 2000 and 2008, the industry invested more than \$58 billion in low and zero emissions technologies. This represents 44 percent of the

\$133 billion spent by all U.S. industries and the federal government combined...U.S. oil and natural gas companies are pioneers in developing alternatives and expanding America's use of virtually every form of energy – from geothermal to wind, from solar to biofuels, from hydrogen power to the lithium ion battery for next-generation cars...The oil and natural gas industry accounts for 22 percent of all the investments made in North America in non-hydrocarbon fuels since 2000.”

Petroleum Reduction

The Executive Summary of the Investment Plan contains many negative comments with regard to the petroleum industry, and continues to perpetuate the petroleum reduction philosophy and policy contained within the IEPR. WSPA feels strongly that the state needs to alter its rhetoric on this subject, and we have provided below the same comments we provided to the Commission on March 11 relative to the 2011 IEPR.

“The Commission continues to favor petroleum reduction policies, despite widespread recognition there is uncertainty about the overall demand for conventional and alternative transportation fuels in the long-term, and about which vehicles may be marketed in the state. These petroleum reduction policies also continue to be embraced by CEC despite recognition that the introduction of commercial scale replacements of alternative fuels and vehicles may not be as near-term as some would like – even with significant incentives from federal, state and local governments.

The 2003 IEPR recommended that the state increase the use of non-petroleum fuels to 20% of on-road fuel consumption by 2020. At the time, this was characterized by the state as a fuels diversification goal rather than a petroleum reduction goal.

Also, AB 1007 required a plan to increase California's production and use of alternative and renewable fuels. This was characterized as a fuel diversity initiative and an expansion of actions to promote alternative and renewable fuels.

These efforts are now being characterized as petroleum reduction initiatives. This is an approach that we believe is inappropriate, counterproductive and very risky in the context of improving California's energy supply security.

We do not believe that there is a state law, executive order or policy mandating petroleum reduction. There are several policy initiatives promoting greenhouse gas emission reductions, fuel efficiency and diversity. And, there are state policies promoting reliable and adequate transportation fuel supplies.

But there is no law, executive order or policy that says the state should encourage or even tolerate the systematic elimination of petroleum fuel supplies at the expense of the state's economy or consumers. A healthy economy depends on a reliable supply of transportation fuels. A reliable supply of transportation fuels requires the contribution of efficiency measures and petroleum-based fuels, plus alternative and renewable fuels.

While the state can no longer rely only on petroleum-based fuels, we also do not have the ability to rely only on efficiency measures or alternative and renewable fuels. As we have testified on many occasions before the Commission, we believe the appropriate pathway to fuels diversification has three segments: efficiency; a cleaner burning petroleum fuels contribution; and, a growing alternative and renewable fuels component.

However, rather than pursuing that three-pronged approach, the CEC has chosen a strategy with a foundation of petroleum reduction – this despite recognizing the many uncertainties associated with achieving adequate future supplies of alternative and renewable fuels.

Nowhere in the IEPR material can we find a suggestion that while taking concerted steps to grow the alternative and renewable fuels market, the state should also promote adequate supplies of petroleum-based fuels. WSPA believes this initiative should be included in a responsible energy policy report such as the IEPR.”

Hydrogen

In line with WSPA’s comments during the IEPR February 24 workshop, we recommend the Commission focus more of its resources – including AB118 resources – on hydrogen, and in particular on hydrogen infrastructure.

WSPA believes some of the CEC resources should also go towards identifying challenges or barriers to hydrogen including the relative cost and availability of vehicles, the cost and engineering complexity of fueling infrastructure, the relative delivered costs of hydrogen fuel from conventional and renewable sources, and the technological challenges of high-pressure fuel storage.

The Investment Plan document contains information in the section on hydrogen electric drive on projections of hydrogen vehicles and discusses the state’s plan to locate hydrogen retail infrastructure strategically. It also includes a discussion of various policy initiatives, including those by the California Air Resources Board (ARB), to ensure the infrastructure and regulatory standards for dispensing are available for the projected commercial-level vehicle introduction.

The petroleum industry has been in discussions with ARB regarding the agency’s projections for the introduction of fuel cell electric vehicles (FCEVs) in the state within the next few years, and its belief that additional clustered retail outlet infrastructure is required to service those FCEVs. Our industry does not believe it is appropriate to use the ARB Clean Fuel Outlet regulation to force our industry to put in retail infrastructure when ARB admits there is no business case for at least several years into the future.

The Clean Fuel Outlet regulation has been in place for over 20 years, but has never been triggered based on the low numbers of projected, and subsequently real numbers of clean fuel vehicles being manufactured and brought into the state. WSPA does believe and encourage, however, that the AB118 program can be utilized to provide the funding for these early adopter facilities – commensurate with a real, verifiable need based on FCEV numbers.

WSPA wishes to comment on a notation in the Hydrogen section that we disagree with the concept of a LCFS credit multiplier to spur H2 infrastructure. This is both because such an idea is contrary to the alleged fuel neutrality of the LCFS, as well as the issue of having to make-up those credits elsewhere to make the programmatic reductions intended for the LCFS whole. CEC mentions that ARB is looking into this and we want to be clear on our position.

Therefore, we recommend the current Investment Plan include additional funds allocated to hydrogen infrastructure as well as any other items that may overcome impediments to infrastructure development. These funds would be in addition to the currently proposed \$13MM, where appropriate, to encourage hydrogen fuel infrastructure, if there is agreement by the CEC and ARB that their determination that hydrogen vehicles will be coming into the state in significant, commercial-scale numbers in the next few years as originally forecast by the auto manufacturers, is reasonable.

Moreover, since there is recognition that these early facilities are very likely unable to demonstrate a business case based on the current cost of the facilities and the low numbers of customers, WSPA recommends the CEC consider providing significant portions in grant monies under AB118, and

consider the possibility of no or minimal matching funds from industry in its solicitation and selection process.

We would like to remind the CEC that WSPA testified on October 31, 2007 on the Alternative Fuels Plan, that, "We are also deeply concerned about the ability of investors/producers to invest in and install the entire infrastructure that will be required to support the alternative and renewable fuels called for under the Plan, and in a manner that meets the forecasted timing of market entry. Accomplishing this could be a most critical element of success in implementing the Plan." This comment and concern has not changed in the past 4 years, but funding from AB118 should be able to support some of these needs.

LCFS Credits

WSPA has historically provided comments about the inability of recipients of the AB118 monies to claim credit for the resulting projects under the ARB's Low Carbon Fuel Standard (LCFS) program. This has in many cases stifled the interest in applying for AB118 monies.

In addition, WSPA continues to question how the CEC determines whether the proposed projects are evolving because of normal market forces or because of mandatory programs like the LCFS. We do not believe it is possible for the Commission to segregate projects in this fashion, so feel this arbitrary threshold criterion is not being applied fairly.

We are also concerned that some parties will decide to apply for AB118 funds, will be successful applicants and receive funding, and then at some point in the future will apply to opt-in under the LCFS program so as to comply with the perception that their projects are not LCFS-driven, for example.

The other parallel concern we have is that parties will decide to apply for AB118 funds and will, as a result, forgo opting-in to the LCFS program, which may lead to an inability of the regulated parties to purchase credits from those parties and may lead to less credit availability within the LCFS program.

We believe this should be a subject of additional discussion within the Commission to see if further work on this – either legislatively or otherwise – is warranted now that the AB118 program has some experience under its belt and the LCFS program has just been initiated.

If you have any questions, please contact me or WSPA staff member Gina Grey, at 480-595-7121 (gina@wspa.org).

Sincerely,

A handwritten signature in blue ink, reading "Catherine A. Kelly-Boyd". The signature is fluid and cursive, with the first name "Catherine" being the most prominent.

c.c. James Boyd – CEC
Pat Perez - CEC
Charles Smith - CEC



ALTERNATIVE TRANSPORTATION FUELS AND ENERGY EFFICIENCY



Western States Petroleum Association

November, 2010

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PETROLEUM COMPANIES - ALTERNATIVE TRANSPORTATION FUELS AND ENERGY EFFICIENCY

Future energy demand will make it likely, if not certain, that petroleum-based energy supplies will continue to play an important role for many decades. Nevertheless, WSPA companies recognize that alternative sources of energy are a growing part of the world energy mix. They are investing dollars and manpower to help make that happen.

Much of their current activity is directed towards stationary power generation – such as the development of new, more efficient and/or cleaner ways to generate electricity (e.g., solar, wind, geothermal). This report focuses on the petroleum industry's work on the development and commercialization of alternative transportation fuels. Many WSPA companies have created and staffed new organizations to spearhead these efforts. There are a few areas of special emphasis: hydrogen, biofuels, research, and energy efficiency.

HYDROGEN

Some consider hydrogen an ideal future transportation fuel. It can be used to power conventional, internal combustion engines, promising water as the only vehicle emission. But, its use in fuel-cell powered electric vehicles promises to be much more efficient. Two disadvantages are that hydrogen is difficult to distribute from a centralized production facility, and it is difficult to store, especially on-board a vehicle.

Many WSPA company efforts involve participating in programs to evaluate the viability of fuel-cell powered vehicles. Some companies provide refueling stations where hydrogen is produced from natural gas on-site, often using technology developed in-house. Some company projects involve technology to produce hydrogen from liquid fuels on board the vehicle itself.

Shell has built hydrogen refueling infrastructure for fuel-cell powered vehicle demonstration projects in Tokyo, Reykjavik, Shanghai, Washington, D.C., New York, and Los Angeles.

BP has partnered with Ford and Daimler Chrysler to provide hydrogen for fuel-cell powered demonstration vehicles in London, Barcelona, Oporto, Sydney, Beijing, Michigan, Florida, and California. All sites outside the USA have been closed.

BP is currently operating five hydrogen demonstration refueling stations in Florida, Michigan, and California evaluating different technologies. Two sites, one in Sacramento and one in Florida are being used to evaluate the production of hydrogen through electrolysis. One site in Michigan is evaluating liquid hydrogen supply. The Burbank, CA site and Dearborn, MI sites are evaluating 700 bar technology. Burbank is also evaluating larger scale supply and on-site production by using a Steam Methane Reformer (SMR).

Chevron is currently operating five hydrogen demonstration refueling stations across the U.S.; three stations in California, one in Michigan, and one in Florida. Each is

demonstrating and evaluating a different technology for on-site production of hydrogen.

- Two of the California stations are located in Southern California and were designed to support a fleet of Hyundai-Kia fuel cell vehicles.
- In Northern California, Chevron has built a prototype hydrogen refueling station as part of the Bay Area HyRoad project. The station will provide fuel for small fleets of fuel-cell powered buses and automobiles operated by the Alameda-Contra Costa Transit District (AC Transit).
- In Florida, Chevron is collaborating with Ford and the State of Florida on the evaluation of hydrogen-fueled internal combustion engine buses.
- In Michigan, Chevron is collaborating with the Air National Guard to demonstrate and evaluate Chevron's advanced steam methane reforming and pressure swing adsorption technologies to convert natural gas into purified hydrogen.

As part of a collaboration with the U.S. Department of Energy, Chevron has partnered with the Gas Technology Institute on a pilot-scale partial oxidation gas turbine project to evaluate the simultaneous production of hydrogen and power.

ExxonMobil is active in the Department of Energy's Freedom Car and Fuel Partnership activities. The company is also continuing its R&D on a process for generating hydrogen from hydrocarbon fuels. If successful, the company believes this technology could impact future use of fuel-cell powered vehicles via improved efficiency in generating hydrogen, either at retail refueling stations or on-board the vehicle.

Several WSPA member companies, including Chevron, and Shell are also members of the California Fuel Cell Partnership, a private-public consortium targeted at addressing the technological challenges that are presented by hydrogen fuel cells when used as transportation power sources.

BP is a corporate sponsor of the University of California, Davis Sustainable Transportation Energy Pathways (STEPS) program researching technologies for sustainable transportation alternatives and greenhouse gas reductions.

ETHANOL

Many petroleum companies are blending more and more ethanol into gasoline. Some are also investing to reduce the cost and increase the benefits of ethanol production, and to investigate its more widespread use in gasoline.

BP, for example is investing in feedstocks which minimize pressure on food supplies and in technologies designed to create advanced fuels with a higher energy content. BP has a 50% stake in Tropical BioEnergia SA, a joint venture with Santelisa Vale and Maeda Group, to produce bioethanol from sugarcane. Tropical's first facility in Edéia, Goiás State, Brazil, began production of

bioethanol in September 2008 and will have a capacity of 115 million US gallons.

BP is also partnering with Verenium Corporation to develop low-cost, lignocellulosic bioethanol from energy grasses, including miscanthus and energy cane, which have a greater yield per acre of feedstock and potentially greater greenhouse gas emissions reductions compared with conventional fuels.

BP also partnered with ABF (British Sugar) and DuPont to construct a \$400 million world-scale bioethanol plant in Hull, UK. The plant will use some of the UK's surplus of feed-grade wheat as its feedstock.

Since 2002, Shell has been working with Iogen Corporation, a Canadian company, to develop the processing technology that enables ethanol to be made from straw using enzymes. This next generation biofuel can be used as a blend in today's cars and if used at 100% concentration can cut Well-to-Wheels CO₂ production by up to 90% compared with conventional petrol.

Iogen Corporation and Shell are exploring commercialization of a full-scale commercial cellulosic ethanol plant. Shell is contributing to Iogen's detailed feasibility and design assessment work.

Since 2007 Shell has partnered with US company Codexis to develop new super enzymes to convert biomass to fuel. Research will focus on adapting enzymes to improve the conversion of a range of raw materials into high-performance fuels. The agreement will see Codexis working closely with both Shell and Iogen Energy Corporation to enhance efficiency within the Iogen cellulosic ethanol production process. The aim of this research is enhancement of the Iogen process and shortened timeframes to full-scale commercial deployment. However, the Codexis deal is not limited to cellulosic ethanol but will include other exciting biofuels routes. Scientists will accelerate existing research into new biocatalysts to convert biomass directly into hydrocarbon components.

ConocoPhillips is conducting R&D on the production of ethanol from coal via intermediate synthesis gas produced using gasification technology. That work is being done in collaboration with the Department of Energy, Oak Ridge National Laboratory, and the universities of Louisiana State and Clemson.

Chevron collaborated with the state of California, General Motors, and Pacific Ethanol to evaluate the use of E-85 as a vehicle fuel. Over a one-year period, Chevron provided E-85 (a mixture containing 85% ethanol and 15% gasoline) at two refueling sites to refuel a fleet of 50-100 vehicles owned by the state of California.

BIODIESEL

In 2006, ConocoPhillips began commercial production (1000 bpd) of renewable diesel produced from soybean oil at their Whitegate refinery in Cork, Ireland. They have also produced renewable diesel from beef tallow at their Borger Texas

refinery as part of their strategic alliance with Tyson Foods.

Shell has partnered with CHOREN Industries in the development of a new process for producing diesel fuel from wood chips, straw, and other sources of biomass. The biomass is first used to produce synthesis gas, which is then converted to biodiesel using Shell's GTL process for converting gas to liquids. Following successful pilot production, CHOREN industries is building a demonstration plant.

In 2007, Shell formed a joint venture company, Cellana, which operates a pilot facility in Hawaii to grow marine algae and produce vegetable oil for conversion into biodiesel. Algae hold great promise because they grow very rapidly, are rich in vegetable oil, and can be cultivated in ponds of seawater, minimizing the use of fertile land and fresh water.

OTHER BIOFUELS

BP, since 2003, has been working with DuPont to explore new approaches to the development of biofuels. The first product from this collaboration will be a new fuel molecule called biobutanol. Biobutanol can be blended at higher concentrations than bioethanol, potentially providing further reductions in GHG emissions. BP and DuPont are constructing a demonstration plant for butanol in Hull, UK that will test and further develop the new biobutanol technology and ensure it is ready for commercial deployment. The plant will be fully operational in 2010. BP and DuPont have also been carrying out vehicle and infrastructure product testing.

Chevron has entered into a partnership with the National Renewable Energy Laboratory (NREL) to explore the production of liquid fuels from algae.

ExxonMobil Research and Engineering Company has formed an alliance with Synthetic Genomics, Inc. as part of a multi-year program to research and develop biofuels from photosynthetic algae. If milestones are met, the company expects to invest over \$600 million in the program, which is aimed at developing algae-based fuels that could be used within the current petroleum supply system and with the existing vehicle fleet.

In February 2008, Chevron and the Weyerhaeuser Company created a 50-50 joint venture company that will focus on developing the next generation of renewable transportation fuels from nonfood sources. The joint venture, Catchlight Energy LLC, will research and develop technology for converting cellulose-based biomass into economical, low-carbon biofuels. The formation of Catchlight Energy is the first milestone of a biofuels alliance announced by Chevron and Weyerhaeuser in April 2007, and reflects the companies' shared view that nonfood biofuels will play an important role in diversifying the nation's energy supply.

ConocoPhillips and Archer Daniels Midland Company have announced they will collaborate on developing renewable transportation fuels from biomass. The alliance will research and seek to commercialize the conversion of crops, wood or switchgrass into biocrude, which would then be converted into fuels.

Since March 2008 Shell has partnered with Virent Energy Systems in the US on a research project to convert plant sugars directly into gasoline and diesel, rather than ethanol. The collaboration could herald the availability of new biofuels that can be used at high blend rates in standard gasoline engines.

UNIVERSITY RESEARCH

The biofuel production technologies in widest use today require feedstocks that are also food crops (e.g., corn, sugar cane and soybeans). These feedstocks may be comparatively expensive and their use sets up competition between the food and energy markets for the same agricultural resources.

Economic processes able to produce biofuels from cellulose (biomass) on a commercial scale would be a major step forward. Scientific breakthroughs are needed to make this a reality. For this reason, a substantial part of petroleum industry attention is focused on appropriate University R&D. Examples include the items below.

BP is committing \$500 million funding over 10 years to the Energy Biosciences Institute (EBI), which combines the efforts of UC Berkeley, the Lawrence Berkeley National Laboratory, and the University of Illinois. Biotechnologists at the EBI will investigate many applications of biotechnology to energy, including advanced fuels. BP is also supporting research at Arizona State University into a range of biofuel feedstocks.

ExxonMobil was a founding member of the Global Climate and Energy Project at Stanford University in 2002. GCEP is a major long-term research program designed to accelerate development of commercially viable energy technologies that can lower GHG emissions on a worldwide scale. Current GCEP research areas include hydrogen, solar energy, biomass, advanced combustion, CO₂ sequestration and advanced materials. ExxonMobil has committed funding of \$100M to the project; total funding by the four sponsors (ExxonMobil, GE, Schlumberger and Toyota) is expected to be over \$200M.

ConocoPhillips began an 8-year program at Iowa State University to develop new biofuel technologies. They are focusing on converting biomass to oil through pyrolysis, a process that uses heat in the absence of oxygen to decompose biomass into a liquid product. This “bio-oil” can be converted to transportation fuels at petroleum refineries.


ConocoPhillips and Iowa State have also been awarded a \$2 million grant from DOE to advance biomass gasification and eventually biomass-to-liquids technology.

Chevron and the Georgia Institute of Technology formed a strategic research alliance to pursue advanced technology aimed at making cellulosic biofuels and hydrogen viable transportation fuels. The alliance is focusing its research on four areas: production of cellulosic biofuels; understanding the characteristics of biofuel

feedstocks; developing regenerative sorbents; and, improving sorbents used to produce high-purity hydrogen.

Chevron and UC Davis executed a research agreement directed at the development of technology for production of liquid transportation fuels from biomass feedstocks. The objective of the Chevron-UC Davis research is to develop commercially viable processes for the production of transportation fuels from renewable resources such as new energy crops, forest and agricultural residues, and municipal solid waste.

The collaboration is expected to focus its research on four areas: understanding the characteristics of current California biofuel feedstocks; developing additional feedstocks optimized for features such as drought tolerance, minimal land requirements, and harvesting technology; production of cellulosic biofuels; and, design and construction of a demonstration facility for biochemical, and thermo chemical production processes.

 Chevron and Texas A&M University executed a strategic research agreement to accelerate the production and conversion of crops for manufacturing ethanol and other biofuels from cellulose.

Chevron will support research initiatives that will focus on several technology advancements to produce biofuels including: identifying, assessing, cultivating, and optimizing production of second-generation energy feedstocks for cellulose and bio-oils with a focus on non-food crops; characterizing and optimizing the design of dedicated bioenergy crops through advances in genomic sciences and plant breeding; developing integrated logistics systems associated with the harvest, transport, storage, and conversion of bioenergy crops; and, developing advanced biofuels processing technologies.

Chevron, ConocoPhillips, and Shell are founding members of the recently formed Colorado Center for Biorefining and Biofuels. Other participants include the University of Colorado, Colorado State University, the Colorado School of Mines and the National Renewable Energy Laboratory. The mission of C2B2 is to improve fundamental understanding and develop new technologies in areas relevant to the future commercialization of integrated, sustainable biorefining and biofuels processes.

In 2008 Shell entered into six research agreements with experts in academic institutions across the world. They are part of a growing program of agreements designed to complement Shell's own biofuels research and development, and to accelerate results. The research program investigates new raw materials and new biofuels production processes, with a focus on improving efficiencies and lowering costs. The research agreements will last between two and five years. They are with: The Massachusetts Institute of Technology (MIT), Massachusetts, US; the University of Campinas (Unicamp), Sao Paulo, Brazil; the Institute of Microbiology, Chinese Academy of Sciences (IMCAS), Beijing, China; the Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences (QIBEBT), Qingdao, China; the Centre of Excellence for Biocatalysis, Biotransformations and Biocatalytic Manufacture (CoEBio3) based at Manchester University, UK; and the School of BioSciences Exeter University, UK. Shell.

ELECTRIC AND ENERGY EFFICIENCY

ExxonMobil pioneered a new technology that will help hybrid vehicles run on lithium-ion batteries. Specialty separator film using this technology is produced and marketed by Toray Tonen Specialty Separator, a joint venture in which an ExxonMobil affiliate has 50% interest.

ConocoPhillips has developed graphite anode materials for high-power lithium-ion batteries that are integral to the commercialization of advanced electric-powered vehicles. These materials are now being sold to Li-ion battery manufacturers under the "CPreme" brand name for applications in automotive, power grid management, and power tools. CPreme® anodes have been qualified for multiple hybrid electric, plug-in hybrid electric, and pure electric vehicle platforms that are due to be rolled out to consumers over the next few years.

BP is participating in a large consortium electric vehicle (EV) project. In the last quarter of 2010, project leader Ecotality will deploy 15,000 charge points to support the roll out of 5,700 Nissan EVs in six US markets. BP is participating in the project to learn about and evaluate EV charging infrastructure technology.

Tesoro installed two state-of-the-art flare gas compressors at its Golden Eagle Refinery in Concord, CA. This equipment takes flare gases – hydrogen, nitrogen, methane and other hydrocarbons – compresses them and returns them to the refinery for use as fuel. The project reduced flaring by 90 percent, which in turn reduced flare emissions by 94 percent.

At its Salt Lake City Refinery, Tesoro's cogeneration operation (using natural gas to generate both electricity and steam), reduces emissions at that facility by more than 500 tons each year.

SOURCES

The activities described in this report were found on the public web sites of the individual companies. Most were found in recent, publicly available press releases archived by each company.

Chevron:

www.chevron.com/news/press contains a search function. Entering “biofuels”, “hydrogen”, and “alternative fuels” led to the information cited.

www.chevron.com/globalissues/climatechange/actionplan was also useful.

ConocoPhillips:

www.conocophillips.com/EN/newsroom/news_releases provided most information.

ExxonMobil:

www.exxonmobil.com/Corporate/ provides a search function. Entering keywords “algae” and “fuel cells” led to the information cited.

BP:

www.bp.com provides a search function. Entering “biofuels” and “hydrogen” led to all the information used.

Shell:

www.shell.com provides a search function. Entering “biofuels” and “hydrogen” led to the information used.