



OIL COMPANIES' INVESTMENTS IN DIRTY FUELS OUTPACING CLEANER FUELS BY FIFTY TIMES

**SUPPLEMENTAL INFORMATION TO THE AIR RESOURCES BOARD ON THE LOW CARBON
FUEL STANDARD**

**SIMON MUI, PH.D.
SCIENTIST, CLEAN VEHICLES AND FUELS**

**ELIZABETH LANDEROS
PROGRAM ASSISTANT**

DECEMBER 12, 2011

SUBMITTED TO:

**Clerk of the Board
State of California, Air Resources Board
1001 I Street, 23rd Floor
Sacramento, CA 95814**

Table of Contents

1	Summary of Contents	1
2	Oil Industry Profits	2
2.1	Annual Profits of Five of The Largest Oil Companies Averaged Nearly \$100 Billion from 2006 to 2010.....	2
2.2	Oil Industry Investments in Dirtier Fuels: Tar Sands	3
3	Oil Industry Investments In Renewable Fuels	4
3.1	Global Snapshot.....	4
3.2	Global Renewable Fuel Production Investments by Oil Companies.....	5
3.3	U.S. Investments in Renewable Fuels.....	7
4	Global Oil Subsidies	8
4.1	Global Snapshot.....	8
4.2	U.S. Subsidies.....	8
5	Appendix: A Selection of Specific Projects	9

1 Summary of Contents

NRDC has assessed the magnitude of oil industry investments in renewable transportation fuels relative to other parts of their investment portfolio. The purpose of doing this was to evaluate the magnitude and types of investments by oil companies being made. Many in the industry have promoted their efforts to invest in alternative, renewable energy sources.¹

At the same time, a number of jurisdictions, including California, the Northeast and mid-Atlantic states, Oregon, as well as the European Union, are implementing or developing cleaner fuel standards. These standards are generally aimed at lowering carbon pollution, reducing oil dependency, and spurring oil companies to invest more in cleaner, alternative fuels. For example, California's Low Carbon Fuel Standard (LCFS) establishes targets for oil companies to reduce the carbon pollution from fuels over time, similar to pollution limits for smokestacks and cars. Oil companies can decide what types of cleaner fuels to sell to meet the standard, such as electricity, renewable fuels, natural gas, or hydrogen. Oil companies, however, are fighting enactment and implementation of these standards and are claiming that cleaner fuels will not be available in sufficient quantities.²

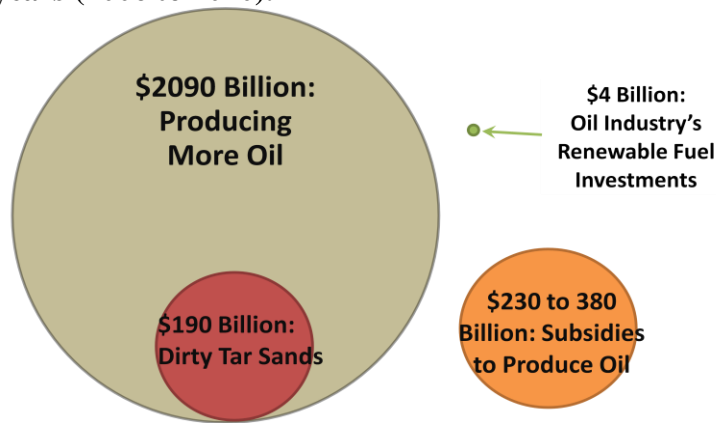
To inform these discussions, NRDC has analyzed the past five years of oil industry investments in lower-carbon renewable fuels such as advanced biofuels and compared these to the industry's investments in traditional oil discovery, extraction, and production. We have also compared these investments against those in even dirtier fuel sources such as Canadian tar sands. Data was gathered from a number of sources including financial statements of individual oil companies, financial and industry consulting services, government and industry reports, and news articles. The research supports the following conclusions:

- **FOR EVERY DOLLAR** the oil industry spent to find and produce more oil, less than half a penny was spent on producing renewable fuels.
- **THE OIL INDUSTRY INVESTS FIFTY TIMES MORE** in producing dirtier tar sands alone than in renewable fuels.
- **GOVERNMENT SUBSIDIES FOR PRODUCING OIL** are one hundred times greater than oil industry investments in renewable fuels.
- **ANNUAL PROFITS** of five of the largest oil companies averaged nearly \$100 billion from 2006 to 2010. Profits have largely gone to stock buybacks and reinvestment in conventional as well as dirtier forms of oil rather than cleaner, alternative fuels.

¹ For example, the Wall Street Journal reported that in 2010 alone Chevron spent \$92 million in their advertising campaigns, such as "We Agree" and "Human Energy" commercials focused on publicizing their alternative energy investments. <http://www.chevron.com/weagree/?statement=renewables>

² Western States Petroleum Association, Presentation to the California Senate Transportation and Housing Committee, "Providing Fuels of the Future," October 24, 2011.

Size of oil industry production investments and subsidies (globally) over the past five years (2006 to 2010).

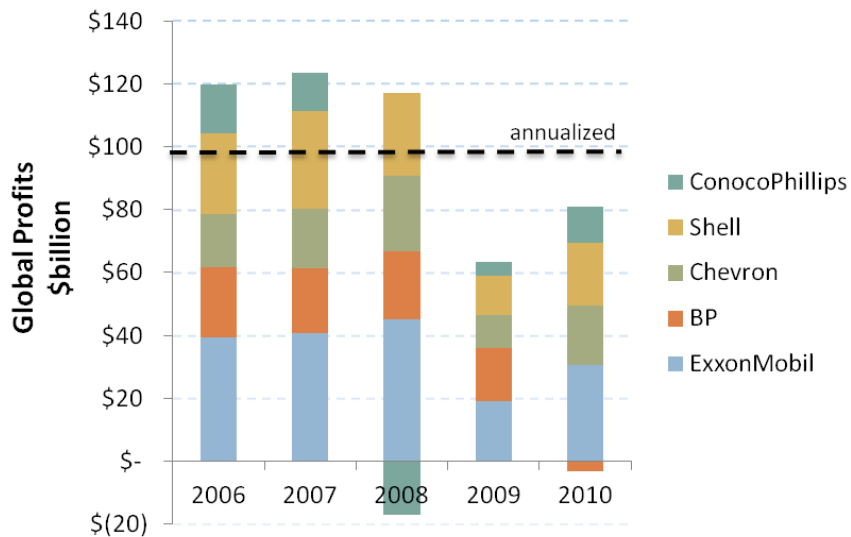


2 Oil Industry Profits

2.1 Annual Profits of Five of The Largest Oil Companies Averaged Nearly \$100 Billion from 2006 to 2010.

Five of the largest oil corporations with operations in the United States include BP, Chevron, ConocoPhillips, ExxonMobil and Shell. Combined global earnings of these five corporations averaged \$97 billion annually as shown in Figure 1.³

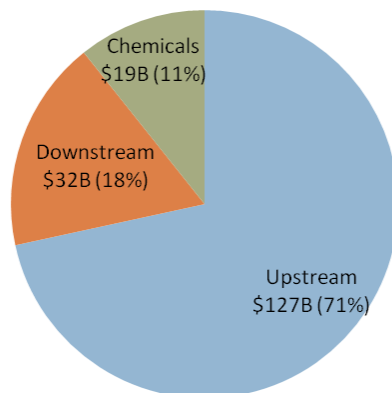
Figure 1: Annual profits of five of the largest oil companies (after income taxes). Source: SEC 10-K filings from individual companies.



³ Based on annual financial reports and SEC filings of Chevron, ExxonMobil, Shell, BP, Valero and ConocoPhillips, SEC filings and annual reports 2002-2011 first quarters findings.

Figure 2 shows a snapshot of the earnings of one oil company, ExxonMobil, in terms up upstream, downstream and chemical operations. Upstream operations include the exploration, recovery, and production of crude oil. Downstream operations include refining, distribution and retail). Chemical operations represent the production of materials such as plastics using petroleum. The company's cumulative earnings over this period were \$174 billion globally with U.S. earnings comprising \$40 billion.

Figure 2: Breakdown of earnings reported by ExxonMobil from 2006 through 2010. Source: ExxonMobil SEC 10-K filings.



A review of the annual reports of the five oil companies shows that, from 2006 to 2010, earnings were used for the following purposes:

- Investing \$660 billion in upstream oil and gas exploration and production⁴
- Spending \$210 billion in stock buybacks⁵
- Investing between \$0.7 billion in renewable fuels (conventional and advanced biofuels) development globally

2.2 Oil Industry Investments in Dirtier Fuels: Tar Sands

Oil industry investments in Alberta, Canada over the past several decades have mainly been used to produce high-carbon intensity crude oils such as tar sands. Estimates from currently available literature shows that, on a fuel lifecycle basis, gasoline produced from tar sands emits from 8 to 37% greater emissions compared to U.S. average gasoline.⁶ Total oil industry investments over the past five years (2006-2010) in this high-carbon intensity source have totaled over \$190 billion according to the Canadian Association of Petroleum Producers.⁷

⁴ Based on Annual Reports for each company for the latest five year period (2006-2010).

⁵ Ibid.

⁶ NRDC (2010), *GHG Emission Factors for High Carbon Intensity Crude Oils*, September 2010.

http://docs.nrdc.org/energy/files/ene_10070101a.pdf

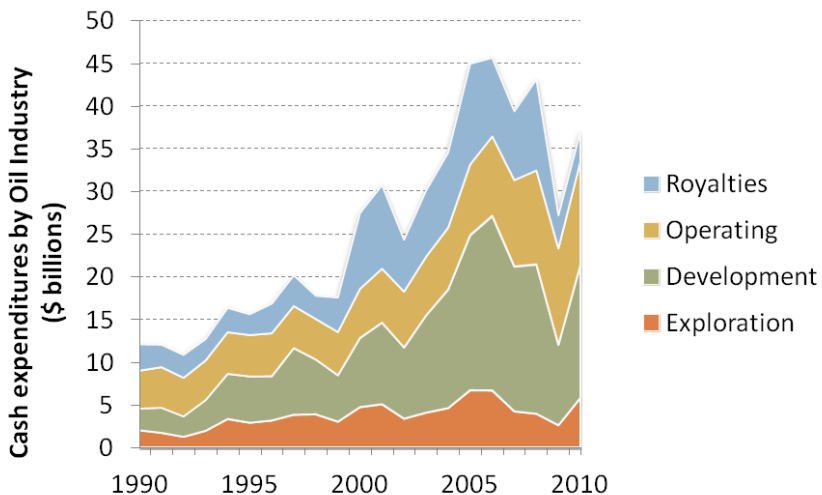
⁷ Canadian Association of Petroleum Producers, *Statistical Handbook*, 2010.

<http://www.capp.ca/library/statistics/handbook/Pages/default.aspx#uv4m3oLe7qAS>

Other investments in other high-carbon sources such as oil shale, coal to liquids, and extra heavy crude oils such as those produced in Venezuela were not assessed but are expected to be on the same order of magnitude as tar sands investments. This analysis will be updated to include this information going forward as data becomes available.

- OIL INDUSTRY INVESTMENTS in tar sands production totaled nearly \$190 billion over the past five years, exceeding their global investments in renewable fuels by fifty times.

Figure 3: Oil industry investments in Alberta, Canada.



3 Oil Industry Investments In Renewable Fuels

3.1 Global Snapshot

According to the International Energy Agency, total global expenditures in upstream crude oil exploration, recovery, and production totaled nearly \$2.1 trillion (or \$2,100 billion) over the latest five-year period (2006 through 2010).⁸ Data from Bloomberg New Energy Finance indicates global renewable fuel investments from all sources – including both the private and public sectors - totaled \$94 billion over the same period.⁹ This investment figure includes both first-generation and advanced, or next-generation, biofuels.

Oil companies’ capital expenditures in alternative transportation fuels are more difficult to assess mainly because they are not formally reported in financial disclosures. However, data collected separately by Bloomberg New Energy Finance and Hart Energy indicate the largest investments in cleaner alternative fuels by oil companies have been made in biofuels.¹⁰

⁸ International Energy Agency (2009), *World Energy Outlook*, citing IEA databases and analysis.

⁹ Bloomberg New Energy Finance (2011), *Bioenergy Insight Call: Q4 2011 – A Bird’s Eye View*, November 17, 2011.

¹⁰ Bloomberg New Energy Finance.

3.2 Global Renewable Fuel Production Investments by Oil Companies

Globally, oil industry investments in producing renewable fuels totaled roughly \$3.9 billion over the 2006-2010 time period. The investments include both those made in producing conventional biofuels such as corn and sugarcane ethanol as well as advanced biofuels.¹¹ Data was obtained from Bloomberg New Energy, Hart Energy, as well as company press releases and press reports. All values represent publicly disclosed transactions. Publically announced financial commitments for which actual outlays could not be confirmed were also given credit based on the time period of the commitment and amount.¹² However, it is noted that commitments are typically based on undisclosed covenants between parties with future outlays dependent on specific milestones being met.

We also note several major project announcements reported in calendar year 2011. Full calendar year data was not available before finalizing this report. That said, three of the largest projects in 2011 appear to include BP's merger and acquisition of Cia Nacional de Acurar e Alcool SA which owns two sugarcane mills in Brazil. The deal is valued at \$680 million. Royal Dutch Shell also entered into a joint venture with Cosan SA, a Brazilian ethanol producer, to form Raizen in a deal with Shell contributing \$1.93 billion.¹³ The third largest deal involves Valero providing \$315 million in equity and debt financing to Darling International Inc, a recycler of food-industry cooking oil, to develop a renewable diesel project. The three projects point to some of the largest investments to date by oil companies. Inclusion of these projects, among smaller ones over 2011, increases the total investments to \$6.9 billion over 2006 to 2011.

Figure 4 below shows the total investments made by oil companies from 2005 through 3Q2011 as reported by Bloomberg New Energy Finance together with data from Hart Energy.

Approximately 54% of the total investments by oil companies were made in corn ethanol and sugarcane ethanol while the remainder was made in advanced biofuels (as defined in the footnotes). The largest advanced biofuel investments were made by Neste Oil which invested in three commercial scale renewable diesel plants. Figure 5 shows that investments in biofuels comprised 0.2% of total oil industry capital expenditures from 2006-2010.

- For every dollar spent on finding and producing oil, the industry spent about a quarter of a penny on renewable fuel investments.

¹¹ Here, we define advanced biofuels broadly as those fuels that utilize (1) feedstock technologies, such as algae and other non-traditional biomass, (2) biochemical conversion technologies, like enzymatic hydrolysis, and (3) thermochemical conversion technologies. Biodiesel and renewable diesel (e.g. produced from hydrotreatment) are also included as advanced biofuel, as defined in the Renewable Fuels Standard. We have included first-generation technologies, like starch fermentation and oils transesterification, that are commonly used to produce corn or sugarcane based ethanol. However, we acknowledge that the definitions and boundaries are imperfect ones.

¹² Attempts to provide credit for publically announced commitments were made, such as ExxonMobil's \$300 million commitment announced in 2009 with algae-based biofuel producer Synthetic Genomics and BP's \$500 million commitment investment in a Energy Biosciences Institute (over ten years). These types of commitments include covenants and contingencies for actual outlays to be made.

¹³ <http://www.bioetanol.org.br/english/noticias/detalhe.php?ID=MTM5>

Figure 3: Oil company investments in conventional and advanced biofuels from 2005 to 3Q2011. \$US Billion.

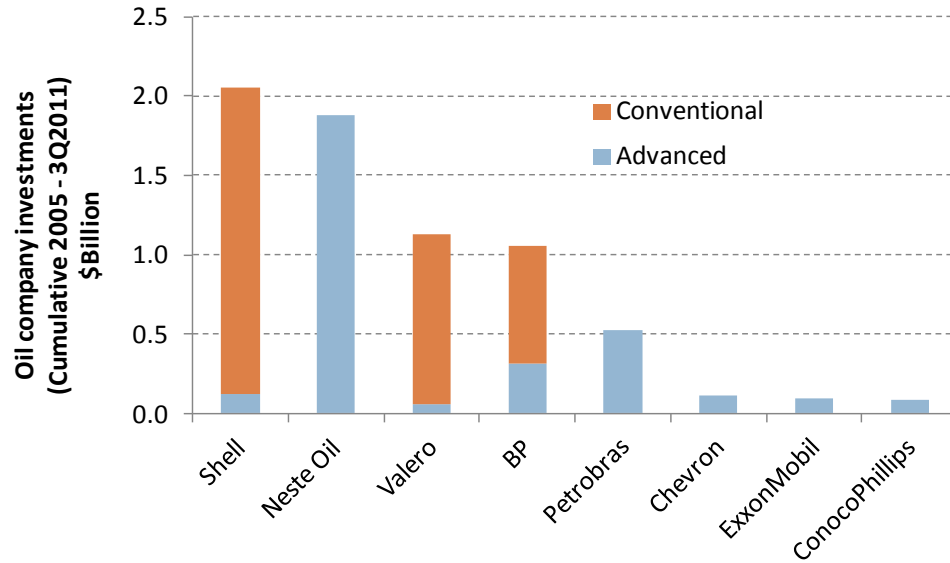
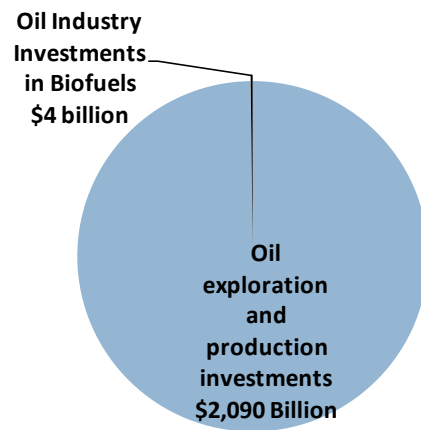


Figure 4: Oil industry investments in upstream oil production versus renewable fuels. Cumulative investments over 2006-2010.



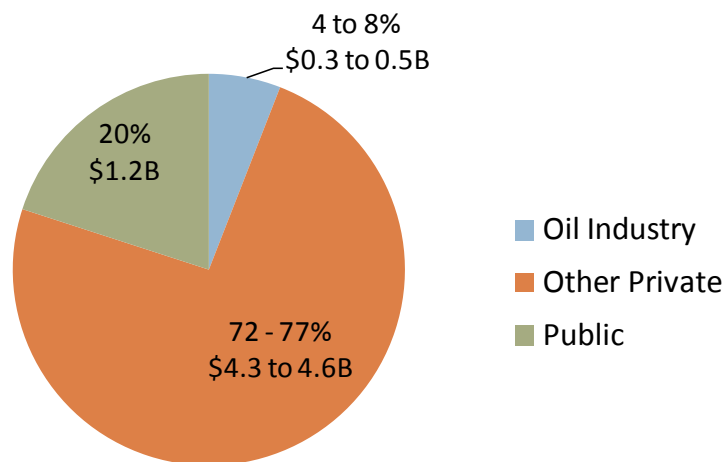
3.3 U.S. Investments in Renewable Fuels

Oil company investments in U.S. advanced biofuels totaled about \$0.3 to 0.5 billion from 2004 to the first quarter of 2011.¹⁴ This compares against all U.S. investments in this category totaling \$6 billion over the same time period.¹⁵ As shown in Figure 6, oil industry investments in domestic, advanced biofuels represented 4% to 8% of total U.S. investments in this sector.

By contrast, U.S. public investments (federal and state) accounted for \$1.2 billion over this time period, representing 20% of total U.S. investments in this sector (\$1.2 billion). The remainder of investments (\$4.3 to 4.6 billion) came from other private sources including venture capital/private equity, public markets, and mergers and acquisitions.

- OIL INDUSTRY investments in advanced biofuels in the U.S. have lagged behind public investments in this sector, despite the requirements under the federal Renewable Fuels Standard.

Figure 5: U.S. investments in next-generation biofuels from 2004 to 1Q2011.



¹⁴ These include publically disclosed projects, based on Bloomberg databases and include seven of the largest companies (BP, Chevron, ConocoPhillips, ExxonMobil, Shell, Tesoro, and Valero)

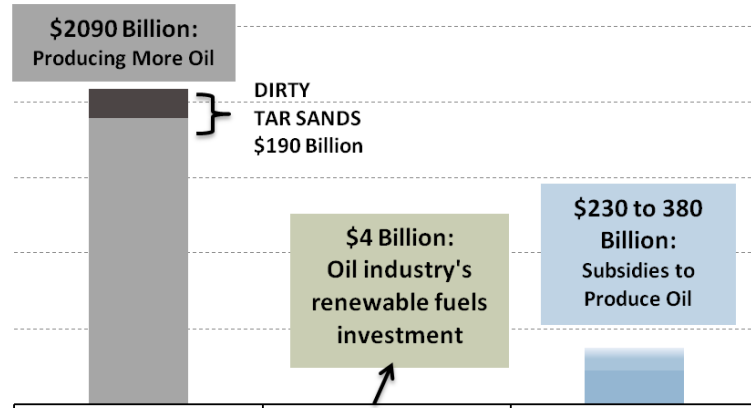
¹⁵ Bloomberg New Energy Finance, Bioenergy - Research Note, May 27, 2011

4 Global Oil Subsidies

4.1 Global Snapshot

According to the International Energy Agency, global energy subsidies for oil industry exploration and production have totaled \$225 to \$375 billion over the past five years (2006-2010), surpassing oil industry investments in renewable fuels production by nearly one hundred times.¹⁶

Figure 6: Oil industry investments in upstream oil production and biofuels compared to oil production subsidies. Five year period, cumulative 2006-2010.



Globally, consumption subsidies for oil (i.e. end-user price subsidies) amounted to \$982 billion on average for the past five years, for a total of \$1210 to \$1360 billion in oil subsidies. Biofuel subsidies have mainly been in the form of producer subsidies and have amounted to \$93 billion over the same period.¹⁷ The vast majority of these subsidies have gone to conventional biofuels.

4.2 U.S. Subsidies

Taxpayers for Common Sense projected the future costs for selected oil and gas subsidies looking ahead to 2011-2015. They estimated that oil and gas companies are expected to receive more than \$78 billion in industry specific and general business subsidies over the next five years from the US federal government. The projections are based on data collected from government agencies including the Joint Committee on Taxation (JCT), the Office of Management and Budget, and the American Petroleum Industry (API).¹⁸

¹⁶ International Energy Agency, *World Energy Outlook 2011*.

¹⁷ Ibid.

¹⁸ In their findings they note that data on federal spending for subsidies and tax incentives to the oil and gas industry is highly decentralized and that government tracking and reporting is spread across multiple agencies that do not observe a standard methodology for calculating costs.

http://www.taxpayer.net/user_uploads/file/Energy/OilandGas/2011/Oil_and_Gas_Report_05-17-2011.pdf

5 Appendix: A Selection of Specific Projects

As described in more detail below, we note that some oil companies have announced greater investments going forward, but whether outlays have been committed has not been publicly disclosed. Some estimates were made to try to capture this by considering the time horizon of the commitments together with the amount proposed, but actual outlays cannot be ascertained.

- ExxonMobil announced in July 2010 plans to spend \$600 million going forward in algae biofuels with Synthetic Genomics, Inc (SGI), provided certain covenants and likely milestones are met according to industry insiders.¹⁹ \$300 million of this is expected to be from direct investment by ExxonMobil with the potential for another \$300 million.
- BP has also announced plans to invest \$500 million over 10 years in R&D at the Energy Biosciences Institute together with U.C. Berkeley, University of Illinois, and Lawrence Berkeley National Labs.²⁰ Actual annual outlays thus far have not been publicly disclosed.
- Valero acquired a number of Midwest corn bioethanol plants that were in bankruptcy proceedings during the economic downturn. The bid was a strategic move to try to lock in a steady supply of ethanol in order to help meet its blending requirements under the federal renewable fuel standard. These included acquiring seven ethanol plants from Verason. In addition, plants from Renew Energy LLC, AS Alliance Biofuels and West LB over 2009 and 2010.²¹ Approximately \$749 million was spent in acquisitions and \$408 in a new plant (Norco biodiesel hydrotreatment plant. These investments were in first-generation plants and not included in advanced, next-generation biofuels category.
- Internal R&D investments or expenditures in alternative fuels are typically not publicly reported by oil companies in their financial statements and could not be estimated or included.

Chevron. The US-based venture capital arm of Chevron Texaco group, Chevron Technology Ventures Investments (CTVI), finds and makes investments in early-stage companies offering technology valuable to Chevron²². Since 2009, CTV has entered into two private equity and venture capital investments, one LS9 and the other Solazyme, both California-based biotechnology companies²³ totaling \$115 million in private equity and venture capital biofuels investment. On 11 May 2006 Chevron Technology Ventures LLC took a 22% stake in Galveston Bay Biodiesel LP. Construction of the plant was scheduled to be completed by December 2006. No financial details were disclosed. Then in December of 2007 a lawsuit was filed accusing Chevron of abandonment by Galveston Bay, claiming that it postponed expansion when Chevron withheld financial backing and claims that Chevron's initial investment and subsequent overtures lured venture capitalists into a "very attractive investment," but then Chevron recoiled when asked to participate in crucial

¹⁹ http://www.exxonmobil.com/Corporate/energy_vehicle_algae.aspx

²⁰ <http://www.bp.com/sectiongenericarticle.do?categoryId=9030041&contentId=7055175>

²¹ Source: Bloomberg New Energy Finance.

²² <http://www.chevron.com/ctv/>

²³ Bloomberg New Energy Finance

rounds of recapitalization to expand the plant, "much to the surprise and detriment to the partnership."²⁴

BP. In the past decade BP's private equity and venture capital investment in biofuels was \$25 million towards companies Qteros (formerly SunEthanol), a Massachusetts-based cellulosic ethanol company and Chromatin, Chicago-based genetic engineering firm for an undisclosed amount. BP Biofuels North America LLC has acquired the asset (Cellulosic biofuels business) of Verenium Corp, US-based proprietary genomic technology developer, for \$98.3 million. A joint ventures with Vercipia Biofuels, Florida-based company owning existing intellectual property and developing cellulosic ethanol projects has been formed by BP PLC and Verenium Corp²⁵. In disclosed amounts, BP has invested \$123 million in biofuels compared to \$50 billion on traditional fuels and profiting \$78 billion over 2006-2010.²⁶

ConocoPhillips. Energy Technology Ventures, US-based venture capital firm focused on investing in energy technologies will be formed in part by ConocoPhillips (Stake Undisclosed) will focus on developing technology for renewable energy, energy efficiency, oil, natural gas, coal, nuclear, emission controls, water and biofuels. The venture plans to back around 30 startup emerging energy technology companies. Energy Technology Ventures' first investments are in Santa Clara, California-based solar photovoltaic cell maker Alta Devices; Centennial, a Colorado based coal-to-methane technology company Ciris Energy Inc. and CoolPlanetBiofuels, a Camarillo, California-based non-food biofuels developer, according to the statement.²⁷ ConocoPhillips did not say how much money it provided to them.

Valero. Valero entered the ethanol business in 2009 with the acquisition of seven ethanol plants in the Midwest. With the more recent acquisition of three additional plants, they have quickly grown to 10 plants spending approximately \$1.2 billion in asset finance and reaching more than 1.1 billion gallons per year of capacity – making Valero one of the largest producers of ethanol in the country. Since 2009, Valero has also invested \$60 million in private equity and venture capital in biofuels in companies like Solix Biofuels Inc, Colorado-based manufacturer of bioreactors to grow oil-rich algae strains in a closed loop system, ZeaChem Inc, California-based cellulosic ethanol technology developer, and Mascoma Corp, Massachusetts-based cellulosic bioethanol technology developer.

Shell. Royal Dutch Shell PLC has acquired an undisclosed stake in Codexis Inc, California-based biotechnology company that develops biocatalysts for use in advanced biofuels and bio-based chemicals production, as well as carbon capture and water treatment, for an undisclosed amount. In 2011, Royal Dutch Shell Plc exited its Cellana joint venture that was formed in 2007 with closely held algae biofuels company HR BioPetroleum Inc. Shell's decision followed an internal review of its advanced biofuels programs and will enable the company to focus on other options that "have shown a better fit" with its portfolio and strategy.²⁸ No financial details were disclosed. In 2010, Shell invested \$46 million into a partnership with Virent Energy Systems to finance the

²⁴ <http://www.biodieselmagazine.com/articles/2123/irreconcilable-differenceschevron-v.-galveston-bay>

²⁵ Bloomberg New Energy Finance

²⁶ Based on annual financial reports and SEC filings of BP 2006-2010

²⁷ http://www.conocophillips.com/EN/newsroom/news_releases/2011news/Pages/01-27-2011.aspx

²⁸ <http://www.bnef.com/News/43468>

development of the 10,000 gallon per year cellulosic biofuel pilot plant located in Madison, Wisconsin, USA.

ExxonMobil. ExxonMobil's program to research and develop next-generation biofuels from photosynthetic algae, which includes a strategic alliance between ExxonMobil Research and Engineering Company (EMRE) and Synthetic Genomics, Inc. (SGI), is expecting to spend more than \$600 million, which includes \$300 million in internal costs and potentially more than \$300 million to SGI, if research and development milestones are successfully met²⁹. No expenditures to date have been reported.

²⁹ http://www.exxonmobil.com/Corporate/energy_vehicle_algae.aspx