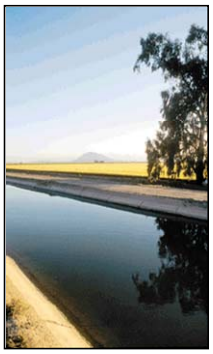


CalPERS AIM Clean Energy & Technology Program

2008 Environmental Measurement Results

CalPERS

ENVIRONMENTAL CAPITAL GROUP
We measure the results you value.

PCG ASSET MANAGEMENT, LLC

CalPERS' leadership in the clean energy and technology sector is producing meaningful environmental results that are being identified and quantified as a part of the industry leading AIM Clean Energy & Technology Program.

Under the direction of the Investment Committee, the CalPERS AIM Program launched the Clean Energy & Technology Program in 2004. This program, through two distinct phases, now has $680 million in commitments. The primary objective of the Program is to generate attractive, risk-adjusted long term financial returns, meeting or exceeding traditional private equity benchmarks. As ancillary benefits, the Program seeks to generate measurable environmental benefits, stimulate employment, and catalyze the adoption of clean energy and technology solutions in the broader market place.

See Page 16 for all source references.

Overview and Summary

This report continues the annual examination of the environmental benefits derived from the CalPERS AIM Clean Energy & Technology Program for the year ended December 31, 2008. CalPERS, through its commitment to measuring and reporting the net environmental benefits created by its investments, has identified as a priority the evaluation of the efficacy of the Program's portfolio. This Program is fostering a growing understanding of the value of such measurement in the investment community. We also see an increased sophistication within the investment funds and portfolio companies in selecting and analyzing appropriate business metrics that can be used to quantify environmental benefits.

The environmental benefits of the Program are grouped into five categories using the framework CLEAN™, representing Carbon, Land, Energy, Air, and Natural Resources. As of the end of 2008, the Program had investments in 18 private equity funds and 9 co-investments, resulting in a total of 135 underlying portfolio companies. These companies produced material environmental benefits in 2008 as summarized in Figure I below.

Figure I: 2008 Summary Environmental Benefits & Equivalents

C	Carbon	•Reduction of 2.5 million metric tons of CO_2 emissions, equivalent to what may be attributed annually to **125,000 people** in the U.S.
L	Land	•Diversion of 277,000 metric tons from landfills, equivalent to what is thrown away annually by **670,000 people** in the U.S.
E	Energy	•Reduction of fossil-based electricity usage and production of renewable electricity equivalent to that consumed annually by **265,000 typical U.S. households**. •Reduction of gasoline and diesel fuel usage and production of renewable biofuels amounting to 155 million gallons, enough to fuel **280,000 automobiles** annually
A	Air	•NOx emission reduction of 28,000 metric tons, approximately **1% of the annual total** from U.S. electric power generation. •Mercury emission reduction of 32 kg, or about 1/3 of that produced annually by a typical U.S. coal-fired power plant.
N	Natural Resources	•Water savings of 12 billion gallons, enough to meet the annual needs of **365,000 people** in the U.S.

Almost half of the companies are still pre-commercial and therefore have not yet contributed quantitative environmental benefits. Nonetheless, over 90% of the companies are classified as either "restorative" (products and services that reverse environmental damage), "sustainable" (energy and other outputs produced with very limited environmental impact), or "more efficient" (products and services that mitigate environmental damage by using resources more efficiently). Therefore, the vast majority of the portfolio companies are expected to improve environmental conditions around the globe upon commercialization.

See Page 16 for all source references.

Environmental Benefit Measurement

Environmental Capital Group (ECG) has developed an innovative method, in conjunction with PCG Asset Management (PCGAM), for measuring and quantifying the environmental benefits of underlying portfolio companies. This method involves qualitative work before fund investments are made, as well as ongoing quantitative analysis and monitoring at the portfolio company level.

Pre-investment Environmental Due Diligence

Before an investment is made, ECG conducts detailed environmental due diligence to determine whether an investment is likely to yield material net environmental benefits. This evaluation is conducted in tandem with the due diligence performed by PCGAM.

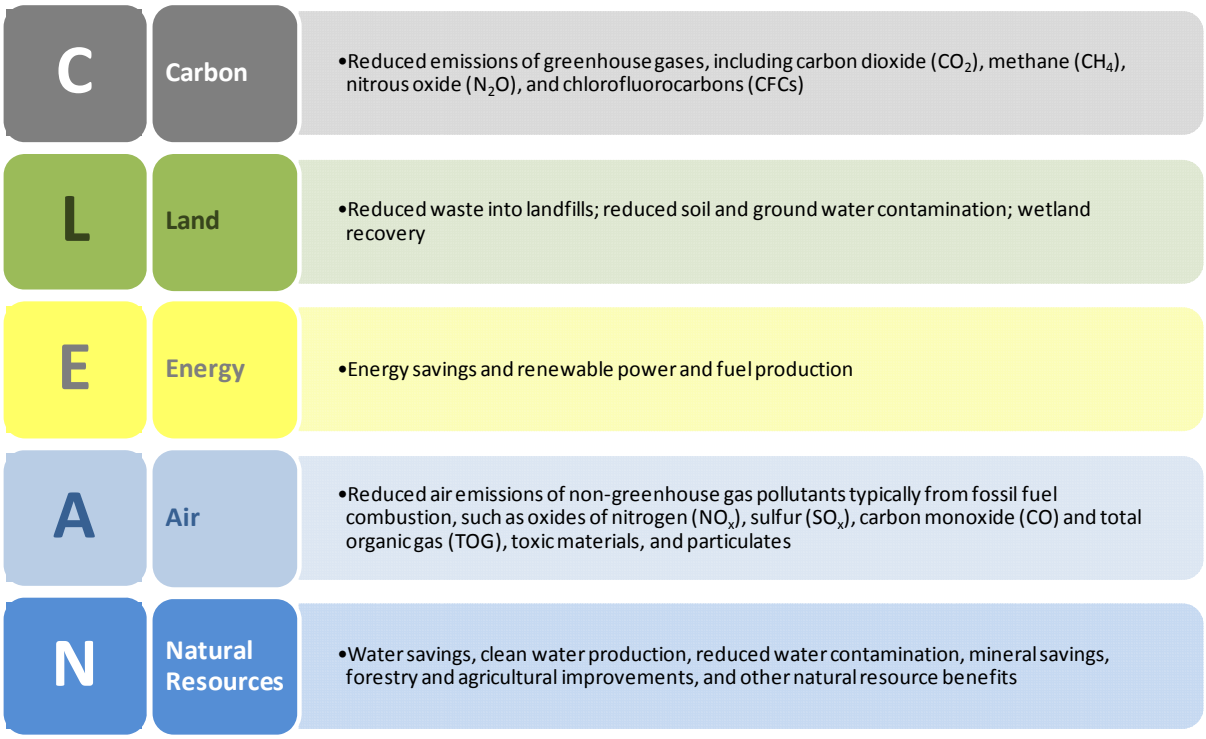
Post-investment Analysis of the Program's Environmental Impact

After investment, ECG works with each general partner to establish a model that converts business results into the associated environmental result for each portfolio company. For example, product units sold or material volume processed is converted to metric tons of emissions avoided or gallons of water saved. ECG assesses improvement or net environmental benefits by comparing the positive and negative environmental impacts of the "new" technology to the baseline technology in common use. Business results are collected annually and used to quantify actual environmental benefits.

CLEAN™ Environmental Investment Benefits

For 2008 we are introducing a reporting framework that compiles diverse environmental benefits into a simple yet comprehensive summary: CLEAN™ Environmental Investment Benefits, shown in Figure II.

Figure II: CLEAN™ Environmental Investment Benefits



See Page 16 for all source references.

The environmental benefits created by this program include resource savings and emission reductions, with the key environmental benefit being the reduced use of fossil-based energy through improved efficiencies or replacement by renewable sources. Reduced use of fossil energy is directly linked to reduced emissions of greenhouse gases and other pollutants, so portfolio companies that produce energy savings or clean energy will also produce emission reduction benefits. Water savings come both from companies that directly save water (smart irrigation, etc.) and as a result of reduced electricity production (which requires significant amounts of water).

ECG uses U.S. Department of Energy data to account for the air emission reductions associated with renewable electricity production or reduced use of electricity in the U.S., based on the weighted average of the emissions from all electricity production.[1] Country-specific emission factors are used for renewable power produced in other countries.[2] U.S. Environmental Protection Agency and California Air Resources Board data are used to calculate emission reductions from gasoline and diesel transportation fuel savings.[3,4] Other sources are used to account for emission savings for particular technologies, such as using biomass to generate power; a particularly useful source is the California Climate Action Registry.[2] A table of the standard factors used for 2008 to calculate implied environmental benefits is in the Appendix.

2008 Environmental Results

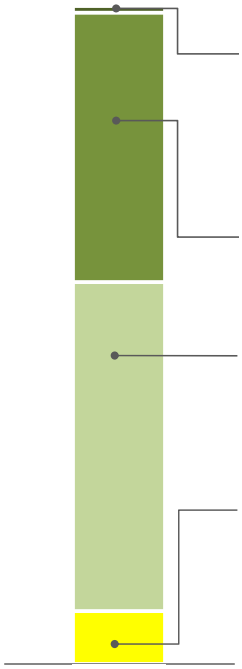
The 135 portfolio companies evaluated as of December 31, 2008 fall into a broad group of clean energy and technology business sectors that are expected to produce significant environmental benefits over the life of the investments. The environmental benefits created by the program can be considered both in terms of actual results in the past year and long-term expected results if the technologies are successfully commercialized. Assessment of future benefits helps paint a complete picture of the environmental impact because almost half of the companies are pre-commercial and produced no benefits in 2008.

Environmental Investment Classes

For 2008, we updated the classification of the realized and potential environmental impact of each company using the categories in Figure III. Most of the companies can be classified as Class II: Sustainable (e.g., solar, wind, geothermal, and biomass energy production, etc.), or Class III: More Efficient (e.g., building and transportation efficiency, energy and power efficiency, water savings, etc.). Both make important contributions to overall environmental improvement. Over 90% of all the companies are in Class I, II, or III, and are therefore expected to improve the environmental conditions around the globe upon commercialization. The net environmental impact of renewable fuels is an active focus of ECG, university, and government research. The process we used to classify renewable fuel companies is described in the Appendix.

See Page 16 for all source references.

Figure III: Environmental Investment Classes of Aggregate Portfolio as of 2008 (135 Companies)



CLEAN™ Environmental Investment Classes	Description
I: Restorative 1%	Projects, products or services that help restore the environment by reversing environmental damage, such as capture and sequestration of pre-existing airborne carbon.
II: Sustainable 41%	Projects, products or services that provide an output with very limited environmental impact, such as renewable energy (solar, wind, wave, etc).
III: More Efficient 50%	Projects, products or services that use resources more efficiently than baseline standards, which mitigates the environmental impact.
IV: Immaterial 8%	Projects, products or services that have similar environmental impact to baseline standards, such as companies that, while in a "cleantech" fund, are not environmentally significant.
V: Harmful 0%	Projects, products or services that degrade the environment at a faster rate than baseline standards.

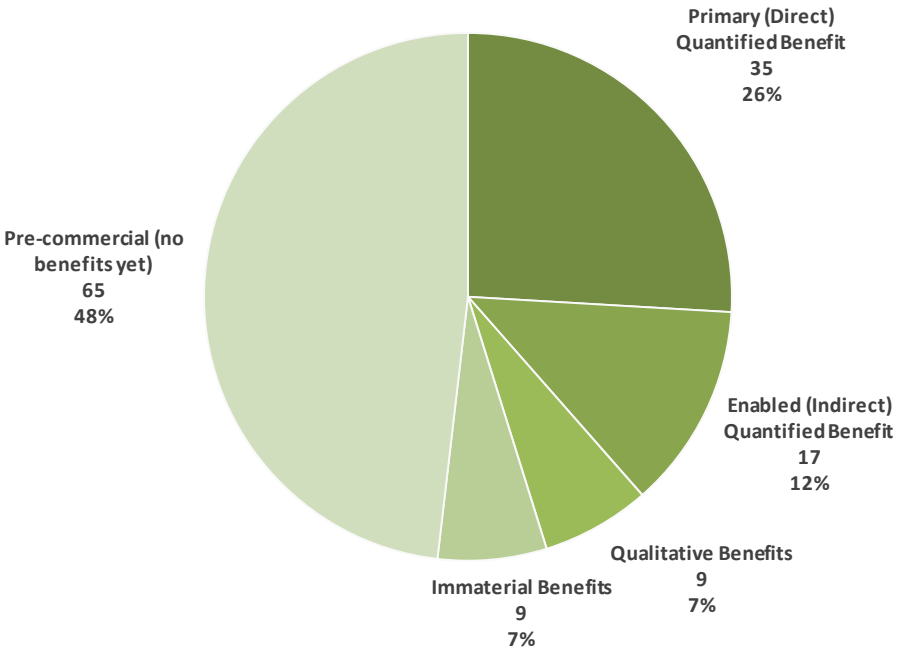
Environmental Benefit Creation

The program includes companies at various stages of commercial development from R&D to market expansion. The portfolio is also diversified across the value chain, from components to end products. Companies whose products directly result in an environmental benefit are termed “primary” (ex: wind farm) and companies that have a more indirect role in creating the environmental benefit are termed “enabling” (ex: smart grid applications). The technology of an enabling company may be used in a variety of applications, so calculating these benefits requires more assumptions and should be considered an estimate. The current stage of development of the 135 companies in creating environmental benefits is shown in Figure IV.

- 65 of the companies are pre-commercial and produced no environmental benefit in 2008.
- 35 companies produced quantified primary environmental benefits.
- 17 companies contributed to quantified environmental benefits in an enabling role.
- 9 companies have products and services important to the environment, but in such an indirect manner that that quantitative calculations are infeasible, thus the benefits are considered qualitatively.
- 9 companies are commercially active, but with relatively immaterial environmental impact.

See Page 16 for all source references.

Figure IV: Environmental Benefit Creation of Aggregate Portfolio as of 2008 (based on # of companies)



Quantified CLEAN™ Results for 2008

The following sections explain the environmental investment benefits for each of the five CLEAN™ categories. This includes:

- Critical issues for each category,
- Summary of the relevant technologies in the portfolio,
- Aggregate quantified results for 2008,
- Comparative ways of putting these results in perspective,
- Growth of benefits since the start of the program,
- Comments about the future outlook for this category.

See Page 16 for all source references.

C	Carbon
L	Land
E	Energy
A	Air
N	Natural Resources

CLEAN™ Environmental Investment Performance

Carbon

Reduced emissions of greenhouse gases, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons (CFCs)

Critical Issues

Scientific consensus: 'very high confidence' that human activities have caused global warming since 1750

- Carbon dioxide (CO_2) is emitted by burning fossil fuels for energy
- Rising levels of atmospheric CO_2 are changing the global climate
- Climate change risks include rising sea levels, severe storms, water shortages, lower crop yields, increased wildfires, disease migration, and species loss

Relevant Technologies in Portfolio

Clean energy technologies reduce carbon intensity of energy use

- Renewable energy: Solar, wind, waste biomass generation
- Energy efficiency technologies: Lighting, insulation, air conditioning
- Renewable fuels: Some technologies provide net carbon benefit

2008 Results

Total benefit: Reduction of 2.5 million metric tons of CO_2

- Primary benefit: Reduction of 1.1 million metric tons of CO_2
- Enabled benefit: Reduction of 1.4 million metric tons of CO_2

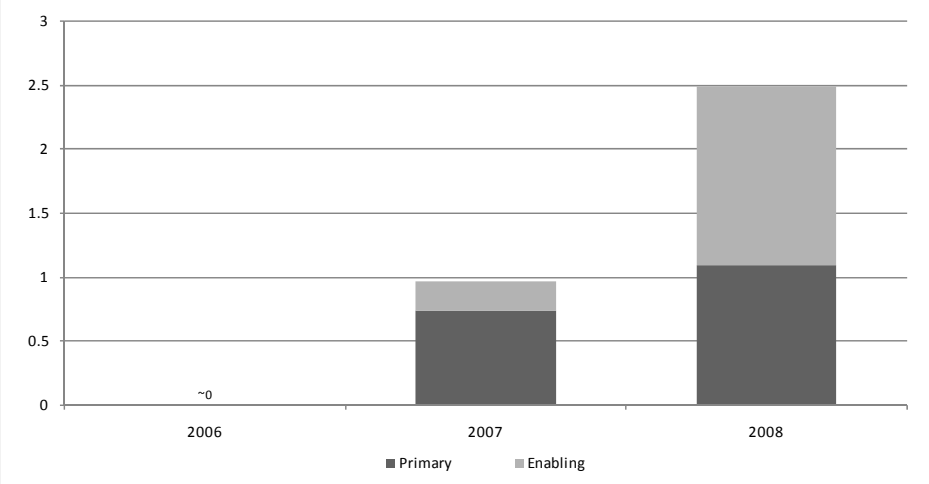
Equivalent Benefit

Equivalent to carbon footprint of 125,000 people

- Based on U.S. DOE estimate of 19.8 metric tons CO_2 per person in the U.S. in 2007 [(1)]

Growth Data

Carbon Dioxide Emission Reductions (million metric tons CO_2)



Future Outlook

Tremendous growth in renewable energy will need to be complemented by energy efficiency and cleaner use of fossil fuels

- Renewable energy and energy efficiency will reduce carbon emissions
- Fossil energy will remain dominant, and carbon capture and storage (CCS) will be pursued to mitigate the carbon emissions

See Page 16 for all source references.

C	Carbon
L	Land
E	Energy
A	Air
N	Natural Resources

CLEAN™ Environmental Investment Performance

Land

Reduced waste into landfills; reduced soil and ground water contamination; wetland recovery

Critical Issues

Pollution risks from industrial and household waste disposal

- Ground and surface water can be contaminated by leaching of toxins
- Uncontrolled landfills produce greenhouse gases, such as methane
- Landfill sites preclude other beneficial land uses and are expensive to acquire and maintain

Conservation of limited resources and recovery of useful materials

- Technologies are evolving to make productive use of waste streams

Relevant Technologies in Portfolio

Reduced landfill by productive use of "waste" materials

- Waste-to-energy: Biomass waste and scrap tires
- Recycling: Scrap tires to rubber flooring and other products
- Regeneration rather than disposal of selective catalyst reduction (SCR) modules

2008 Results

Primary benefits

- Diversion of 277,000 metric tons of solid waste
- Avoided disposal of 9 metric tons of arsenic

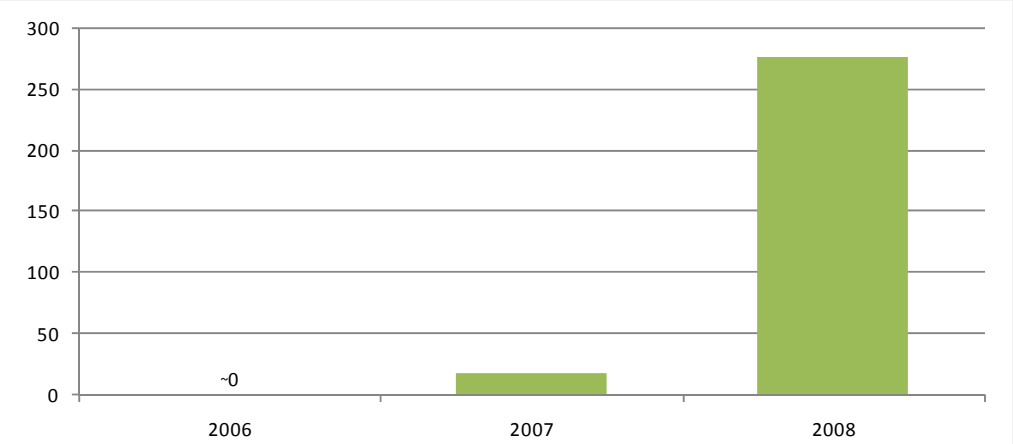
Equivalent Benefit

Equivalent to landfill footprint of 670,000 people

- Based on U.S. EPA report of 4.62 pounds per capita per day – 54% to landfills [5]

Growth Data

Landfill Diversion (1000 metric tons)



Future Outlook

Stringent regulation and increasing costs will reduce use of landfills

- Focus on waste prevention, minimization, reuse and recycling
- Reduction of waste volume will ease management of landfills and reduce potential for toxic contamination of water and air

Energy recovery from wastes will become an increasingly important component of resource and energy conservation

See Page 16 for all source references.

C	Carbon
L	Land
E	Energy
A	Air
N	Natural Resources

CLEAN™ Environmental Investment Performance

Energy

Energy savings and renewable power and fuel production

Critical Issues

Energy availability is critical for economic stability and growth

- Fossil fuels are concentrated in certain regions, causing a lack of energy security in areas without sufficient energy resources

Fossil energy is a finite resource that emits carbon dioxide when burned

- Fossil fuels release long-sequestered carbon, raising atmospheric concentrations

Relevant Technologies in Portfolio

Clean energy technologies reduce consumption of fossil fuels

- Renewable energy: Solar, wind, waste biomass generation
- Energy efficiency technologies: Lighting, insulation, air conditioning
- Fuel efficiency: Diesel truck fleet efficiency
- Renewable fuels: Ethanol and biodiesel

2008 Results

Energy Type	Primary	Enabled	Total
Electricity Savings	665 GWh	452 GWh	1117 GWh
Renewable Electrical Energy Production	1204 GWh	890 GWh	2094 GWh
Fuel Savings	1.4 million gal	19.7 million gal	21.1 million gal
Renewable Fuel Production	134 million gal	0	134 million gal

Equivalent Benefit

Electricity savings and renewable electricity for 265,000 households

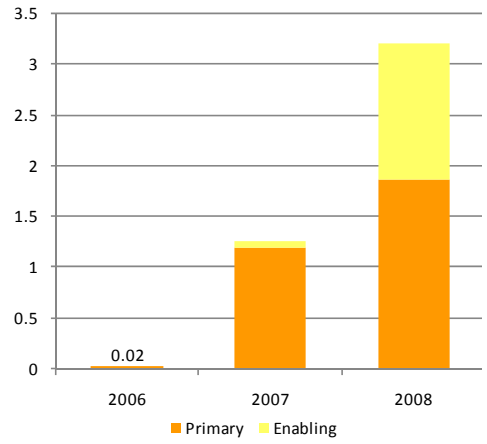
- Based on US DOE estimate of 12.2 MWh per household in 2007 (1)

Fuel savings and renewable fuels: Annual use of 280,000 automobiles

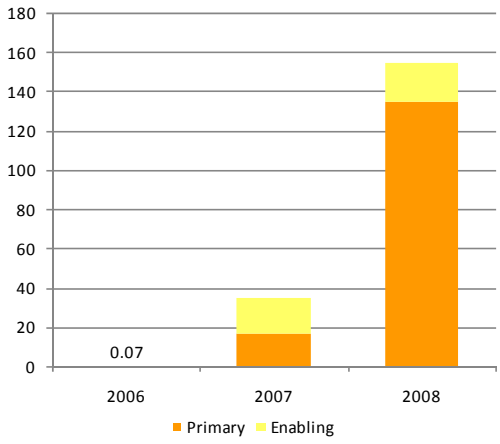
- Based on average use of 555 gallons per year

Growth Data

Electricity Savings & Renewable Power Production (terawatt hours)



Fuel Savings & Renewable Fuel Production (million gallons)



Future Outlook

Rising energy needs will demand additional energy generation

- Energy efficiency is still “low-hanging fruit” to free up capacity
- Given limited fossil fuel resources and climate change risks, new generation should be clean, efficient, and renewable

See Page 16 for all source references.

C	Carbon
L	Land
E	Energy
A	Air
N	Natural Resources

CLEAN™ Environmental Investment Performance

Air

Reduced air emissions of pollutants, such as oxides of nitrogen (NOx), sulfur (SOx), carbon monoxide (CO) and total organic gas (TOG), toxic metals, and particulates

Critical Issues

While air quality in the U.S. has improved significantly, pollutants released elsewhere have global implications

- State-of-the-art technology to control emissions from power plants (especially coal-fired) and cars and trucks needs to be economically viable for global implementation
- Even seemingly small amounts of mercury from coal-fired plants accumulates in food sources, especially fish, with impact on health

Relevant Technologies in Portfolio

Emission controls on coal-fired plants and reduced burning of fossil fuels

- Emissions improvements through selective catalyst reduction (SCR)
- Renewable and energy-efficient technologies reduce use of fossil fuel
- More efficient vehicles reduce emissions from gasoline and diesel

2008 Results

Total benefit: Reduction of 28,000 metric tons of NOx, 5,000 metric tons of SOx, 1,000 metric tons of other combustion gases, and 32 kg mercury

- Primary benefit: Reduction of 3,000 metric tons combined combustion gases (NOx, SOx, CO, and TOG) and 15 kg mercury
- Enabled benefit: Reduction of 27,000 metric tons of NO_X, 4,000 metric tons of SOx, CO, and TOG, and 17 kg mercury

Equivalent Benefit

NOx emission reductions approximately 1% of U.S. total from electric power generation

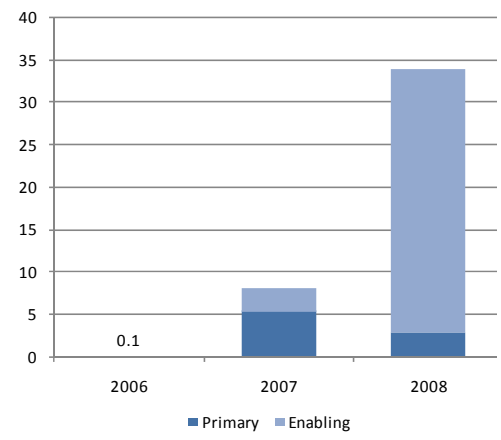
- Based on U.S. DOE total of 3.3 million metric tons of NOx in 2007 (1)

Mercury emission reduction equivalent to approximately 1/3 of a U.S. coal-fired power plant

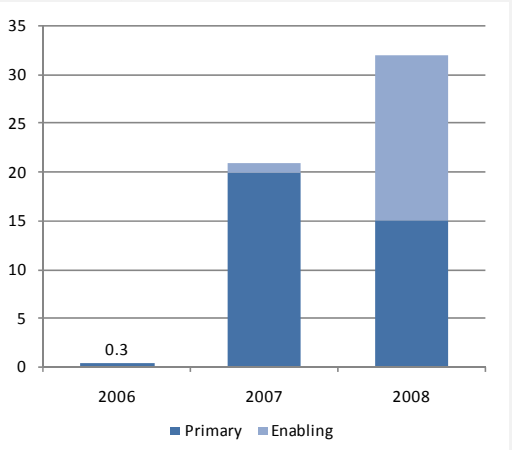
- Based on U.S. DOE total of 49 tons Hg from 476 coal-fired plants (1)

Growth Data

Combustion Gas Reductions (1,000 metric tons)



Mercury Reductions (kg)



Future Outlook

Emission controls to be increasingly regulated globally

- Emissions of air pollutants continue to be a major detriment to human health as well as ecosystems due to acid rain

See Page 16 for all source references.

C	Carbon
L	Land
E	Energy
A	Air
N	Natural Resources

CLEAN™ Environmental Investment Performance

Natural Resources

Water savings, clean water production, reduced water contamination, mineral savings, forestry and agricultural improvements

Critical Issues

Water scarcity

- Fresh water is a finite resource that is critical for life
- Regional distribution of water does not match needs – the World Health Organization cites clean water as the single most important factor in determining public health with 40% of people lacking adequate sanitation
- Climate change is escalating extremes of water: too little or too much, too suddenly

Relevant Technologies in Portfolio

Water efficiency

- Smart irrigation for residential and commercial landscapes
- Energy savings and renewable energy reduces water use required by fossil-based steam-turbine power generation

Clean water production and protection

- Desalination
- Substitute for synthetic pesticides that may contaminate water

2008 Results

Total benefit: 12 billion gallons of clean water

- Primary benefit: Savings of 10 billion gallons and production of 1 billion gallons of clean water. Replacement of 202 metric tons of pyrethroid pesticides with plant-oil based biodegradable products
- Enabled benefit: Savings of 1 billion gallons of water

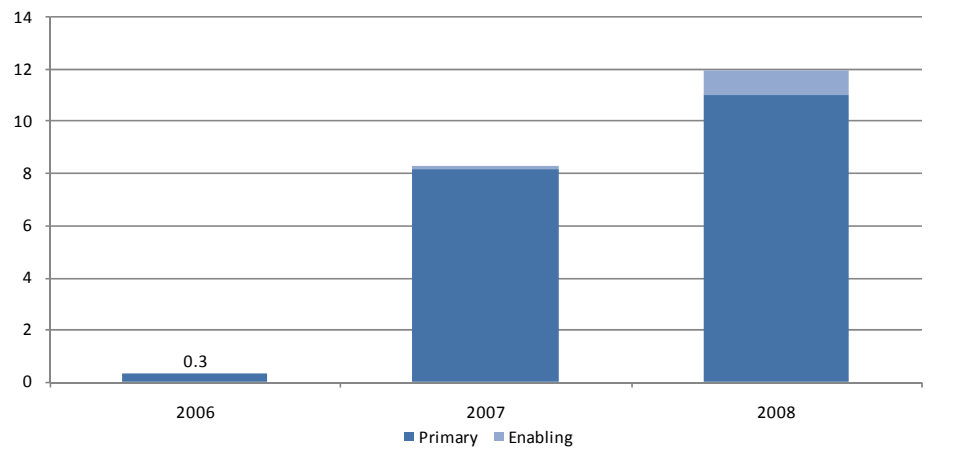
Equivalent Benefit

Equivalent to annual water footprint of 365,000 people

- Based on USGS estimates for U.S. water consumption per capita [6]

Growth Data

Water Savings (Billion gallons)



Future Outlook

Global warming will disrupt snowpack and water runoff patterns, making water management increasingly critical and expensive

Ocean pollution from runoff from lawns, roads and farms will be exacerbated by continued population and industrial growth, creating "dead zones" in coastal oceans

See Page 16 for all source references.

Looking Forward

The program is pioneering in its measurement of environmental benefit measurement system. Working in collaboration with PCGAM and the general partners in the program, ECG has established a robust method for quantifying the environmental impact of a large number of companies without undue effort on the part of the general partners or their portfolio companies. The key to this efficiency is that we have established tools and frameworks for the most common types of environmental benefits. We also automatically calculate the implied benefits that derive from related impacts, such as the greenhouse gas emission reductions that result from reduced fossil energy consumption.

Now that the analytical framework is in place, we will continue to refine future analyses, such as including secondary benefits and estimating total environmental impact at market maturity. Over the next several years, environmental benefits should grow substantially as companies transition into production, current production quantities scale up, and technology break-throughs are licensed or otherwise transferred throughout the industry. The growth stage of these companies will require scale-up capital to realize the full environmental and business potential of these technologies. For many of these technologies, the long-term applications will be infrastructure-related projects. Finally, for nearly limitless growth and environmental impact, these technologies must migrate out of the United States and into the rest of the developed and developing world. CalPERS and other institutional investors now have the opportunity to make prudent long-term investments across multiple asset classes in support of clean energy and technology deployment.

See Page 16 for all source references.

Appendix

Emission Factors

Table 1: Factors Used to Calculate Implied Environmental Benefits

Type	Units	Factor	Source
Converting electricity savings and renewable power production to gas emission reductions:			
CO_2 Emissions	metric tons (t)/GWh	612.54	(1) Table A8 and A18
NOx Emissions	metric tons (t)/GWh	0.828	(1) Table A8
SOx Emissions	metric tons (t)/GWh	2.253	(1) Table A8
Hg Emissions	g/GWh	12.407	(1) Table A8
Converting electricity savings to water savings:			
Water	gal/KWh	1.13	ECG Calculation
Converting gasoline fuel savings to gas emission reductions:			
CO_2 Emissions	metric tons (t)/1000 gal	8.81	(3)
NOx Emissions	metric tons (t)/1000 gal	0.00842	(4)
SOx Emissions	metric tons (t)/1000 gal	0.000085	(4)
CO Emissions	metric tons (t)/1000 gal	0.09824	(4)
Total Organic Gas (TOG)	metric tons (t)/1000 gal	0.01125	(4)
Converting diesel fuel savings to gas emission reductions:			
CO_2 Emissions	metric tons (t)/1000 gal	10.15	(3)
NOx Emissions	metric tons (t)/1000 gal	0.09934	(4)
SOx Emissions	metric tons (t)/1000 gal	0.000094	(4)
CO Emissions	metric tons (t)/1000 gal	0.02933	(4)
Total Organic Gas (TOG)	metric tons (t)/1000 gal	0.00844	(4)

Renewable Fuels

The net environmental impact of renewable fuels is an active focus of ECG, university, and government research. In 2008, ECG and CalPERS sponsored an assessment by the Energy and Resources Group at U.C. Berkeley of the biofuel companies in the program. One focus of the assessment was on how the land use changes that result from diverting crops grown on arable land to produce biofuels indirectly causes greenhouse gas release via conversion of forests and grasslands to cropland elsewhere. In May 2009, the U.S. Environmental Protection Agency issued *EPA Lifecycle Analysis of Greenhouse Gas Emissions from Renewable Fuels* [(7)] as part of its proposed revisions to the National Renewable Fuel Standard.

This new EPA report confirms the conclusions of the ECG and U.C. Berkeley study that some renewable fuel processes result in an initial spike in greenhouse gas (GHG) emissions because of land use changes. To make a "fair" comparison between renewable fuels and fossil fuels, a time horizon longer than one year must be considered. The EPA included a 30 year time horizon for assessing future GHG emissions with all emissions weighted equally regardless of the time of emission and a 100 year time horizon with emissions "discounted" at 2% annually to account for CO_2 remaining in the atmosphere. Table 2 is draft results for common fuel pathways under these two scenarios.

See Page 16 for all source references.

Table 2: Draft Lifecycle GHG Emission Reduction Results for Different Time Horizon and Discount Rate Approaches. (7)

Fuel Pathway	100 year, 2% Discount Rate	30 year, 0% Discount Rate
Corn Ethanol (Natural Gas Dry Mill)	-16%	+5%
Corn Ethanol (Best Case natural Gas Dry Mill)*	-39%	-18%
Corn Ethanol (Coal Dry Mill)	+13%	+34%
Corn Ethanol (Biomass Dry Mill)	-39%	-18%
Corn Ethanol (Biomass Dry Mill with Combined Heat and Power)	-47%	-26%
Soy-based Biodiesel	-22%	+4%
Waste Grease Biodiesel	-80%	-80%
Sugarcane Ethanol	-44%	-26%
Switchgrass Ethanol	-128%	-124%
Corn Stover Ethanol	-115%	-116%

*Best case plants produce wet distillers grain co-product and include the following technologies: combine heat and power (CHP), fractionation, membrane separation and raw starch hydrolysis.

We have categorized the environmental impact of the companies in the program based on the EPA assessment using the 30 year, 0% discount rate approach and high level information about the fuel and energy source used (or planned to be used) by each company. This categorization is shown in Table 3 and will be updated as the EPA refines its standards and the company processes are commercialized.

Table 3: Renewable Fuel Environmental Investment Classes

CLEAN™ Environmental Investment Classes	Description as each relates to renewable fuels
I: Restorative	Next generation technologies that remove large amounts of airborne carbon (e.g., using algae) and use renewable energy may fit into this category
II: Sustainable	Ethanol from waste and non-agricultural crops (e.g., cellulose, switchgrass, corn stover); Biodiesel from waste grease
III: More Efficient	Ethanol from sugarcane and wheat
IV: Immaterial	Ethanol from corn using natural gas or biomass as energy source; Biodiesel from soy
V: Harmful	Ethanol from corn using coal-based power as energy source

See Page 16 for all source references.

Sources

1. U.S. Department of Energy. *Annual Energy Outlook 2009 - Appendices*. Emission factors are the ratio of total U.S. reported emissions to total electricity net generation in 2007 for each emission type.
2. California Climate Action Registry, General Reporting Protocol. Version 3.1, January 2009.
3. U.S. Environmental Protection Agency. *Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel*. EPA-420-F-05-001, February 2005.
4. California Air Resources Board. *Almanac Emission Projection Data – 2008 Estimated Annual Average Emissions* (2009) and http://www.arb.ca.gov/app/emsinv/trends/ems_trends_results.php. Gasoline emission factors are based on light duty passenger motor vehicles in 2008 in California. Diesel emission factors are based on heavy heavy-duty diesel trucks in 2008 in California.
5. U.S. Environmental Protection Agency. *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2007,* EPA-530-F-08-018, November 2008.
6. U.S. Geological Survey, *Water Science for Schools,* Modified May 2009.
7. U.S. Environmental Protection Agency. *EPA Lifecycle Analysis of Greenhouse Gas Emissions from Renewable Fuels.* EPA-420-F-09-024, May 2009.

See Page 16 for all source references.