



## CLEANUP – CLEAN AIR

DIESEL EMISSIONS & GREEN HOUSE GAS REDUCTIONS

# Smart Energy Resource Guide

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Region 9  
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NARPM



# Purpose

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**SERG:** Provides information on implementing renewable energy technologies and reducing diesel emissions on Superfund cleanup and redevelopment sites



Solar – Wind Hybrid (ref: NREL)



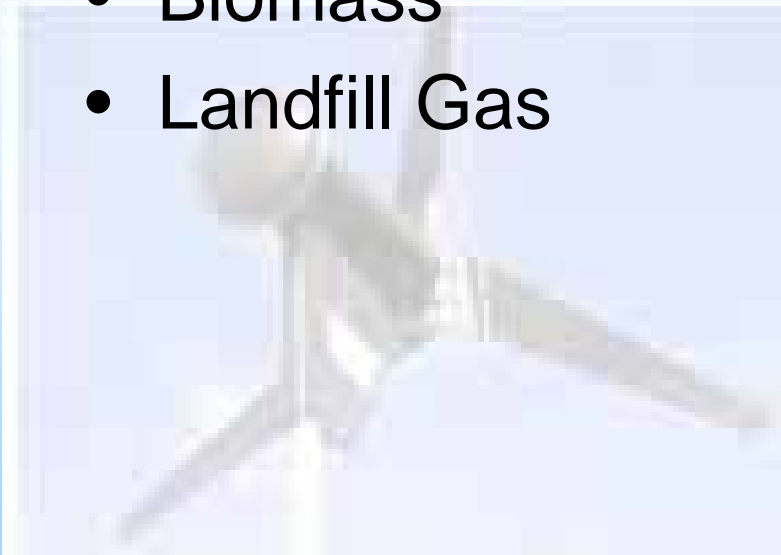
Diesel Oxidation Catalyst Retrofit  
(ref: Schattanek)

# Technologies

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## Renewable Energy Technologies

- Solar
- Wind
- Biomass
- Landfill Gas



(ref: Solar Energy Alliance)

## Retrofits and Alternative Fuels

- Diesel Oxidation Catalysts (DOC)
- Diesel Particulate Filters (DPF)
- Biodiesel
- Emulsified fuel

# Consider This...

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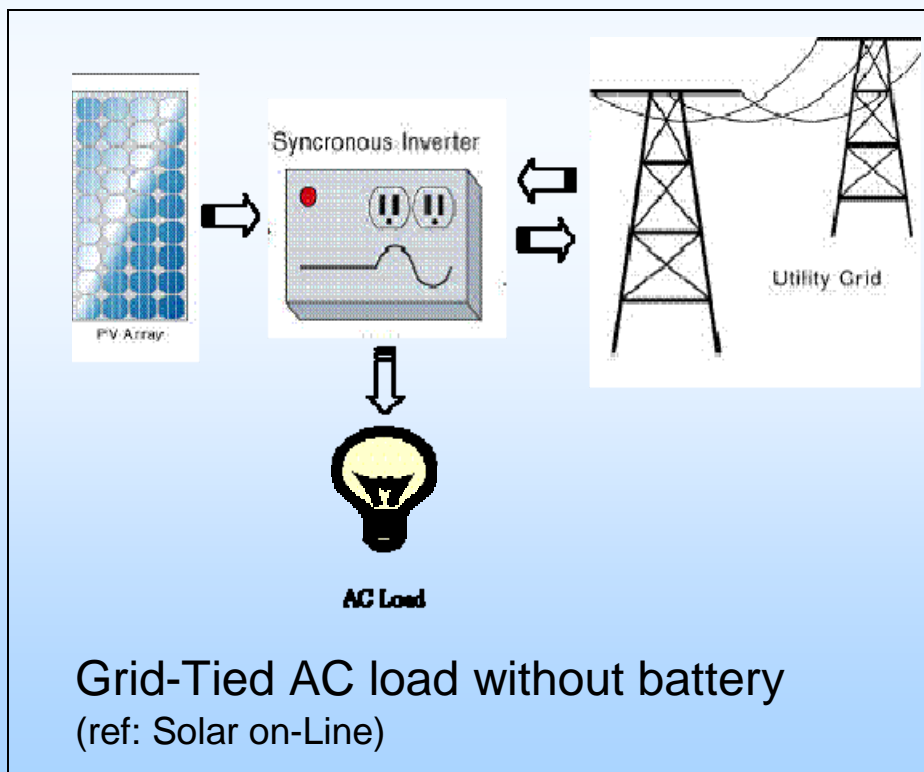
**What is the main reason for implementing a renewable energy project and/or reducing diesel emissions at my site?**

- to reduce pollution and greenhouse gases?
  - to set an example and walk the talk?
    - to reduce my site's energy bill?
    - to provide electricity for my site?
    - to bring power to a remote site?

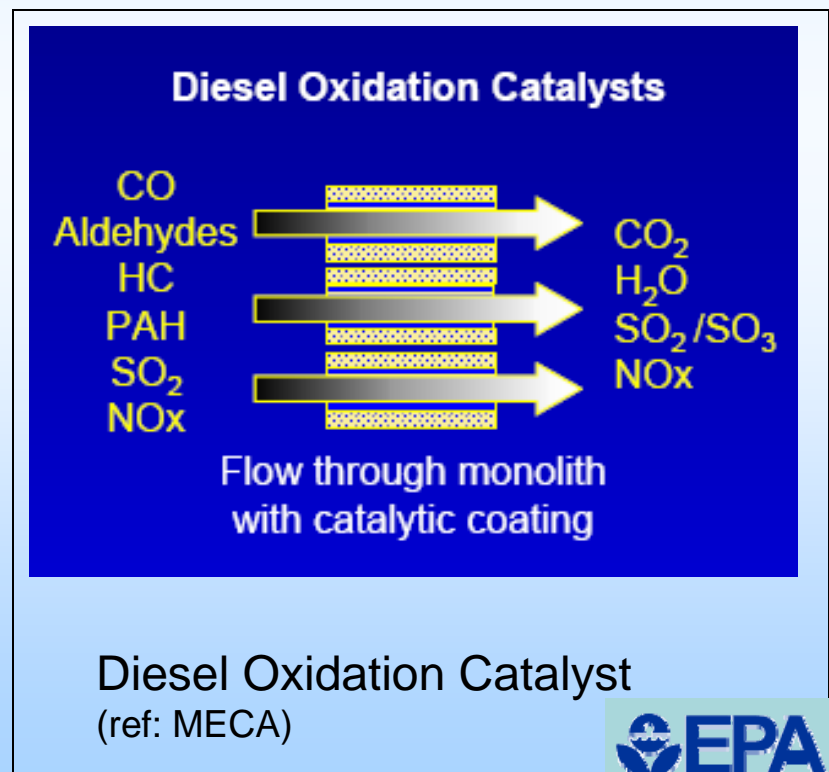
# Overview of Technology

- Basics of technologies covered
- Appendix with more detailed information

## Solar



## Diesel Retrofit



# Preliminary Evaluation

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## Solar:

- 1) Does your site receive adequate sunshine?
- 2) Does your site have space for panels?
- 3) Is it unshaded from 9am to 3pm?

## Diesel Retrofits:

- 1) Survey your fleet for engine specifics
- 2) Which EPA or CA Air Resources Board verified technologies are compatible?

# Rules of Thumb

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## Solar:

$$\text{Size of PV system (kW)} = \frac{\text{Energy needs per month (kWh / month)}}{150 \text{ kWh}}$$

$$\text{Cost of system (\$)} = \text{Size of system (kW)} \times \$10,000$$

$$\text{Space needed (ft}^2\text{)} = \text{Size of system (kW)} \times 100 \text{ ft}^2$$

# Tools

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## Renewable Energy

- Costs
- Energy production
- Economic analysis
- Emission reductions



## Diesel Retrofit or Refuel

- Emission Reductions



# Finding an Installer

**FIND SOLAR**  
Connecting You to Renewable Energy Professionals

**ACRO ELECTRIC, INC.**  
598 SOUTH SIERRA AVE.  
OAKDALE, CA 95361  
Contact: STEVE VELLA  
Phone: 866-711-ACRO  
Fax: 209-848-0521  
Email: STEVE@ACROELECTRIC.COM  
Website: [HTTP://WWW.ACROELECTRIC.COM](http://www.acroelectric.com)

**Summary of Experience & Qualifications**

**Overall Customer Rating:**  
Great  
Based on 17 of 17 reviews providing an Overall Rating.  
[View Reviews](#) [Rate this Solar Pro](#)

**Credit Risk: LDW**  
Based upon D&B [Paydex](#) score  
Last checked 76 days ago.  
This Solar Pro has indicated to us they do not have liens nor bankruptcies.

**3rd-Party Technical Certifications:**  
**LEED** Certified staff member(s)

**They Offer:**  
Commercial Solar Electric Systems  
Residential Solar Electric Systems

**Other Services:**  
Solar System Design & Architecture

[» View Company Profile](#)

**FIND SOLAR**  
PRE-SCREENED SOLAR PRO

Solar

[www.findsolar.com](http://www.findsolar.com)

## Diesel Retrofit

[www.epa.gov/otaq/retrofit/cont\\_retomfrs.htm](http://www.epa.gov/otaq/retrofit/cont_retomfrs.htm)

**U.S. Environmental Protection Agency**

**Voluntary Diesel Retrofit Program**

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You are here: [EPA Home](#) » [Transportation and Air Quality](#) » [Voluntary Diesel Retrofit](#) » [Contacts](#) » [Retrofit Manufacturer Contacts](#)

**Retrofit Manufacturer Contacts**

The retrofit manufacturers in this table make products whose performance has been verified ([verified retrofit technologies](#)) through the EPA Voluntary Diesel Retrofit Program.

**Key Topics: [Contacts](#)**

- EPA Retrofit Team
- Retrofit Makers
- Engine Makers
- Fuel Companies
- EPA Regions

**Diesel Engine Retrofit Manufacturers**

Manufacturer	PM, HC, CO Control (Particulate matter, hydrocarbons, carbon monoxide)	NOx Control (Nitrogen oxides)	Contact Information
Caterpillar Inc. <a href="http://www.cat.com">www.cat.com</a> <a href="#">EXIT Disclaimer</a>	Oxidation Catalysts, Diesel Particulate Filters	--	Mr. Glenn M. Luksik Regulations and Funding Consultant Caterpillar Emissions Solutions (309) 578-7552 (309) 258-9726 Cell (309) 578-2998 Fax e-mail: <a href="mailto:Glenn.Luksik@epa.gov">Glenn.Luksik@epa.gov</a>



# Funding Sources

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National, Regional, and State Incentives  
Grants \* Rebates \* Tax Credits



Digester (ref: Penn State University)



DPF Retrofit (ref: West Coast Collaborative)

# Renewable Energy Credits

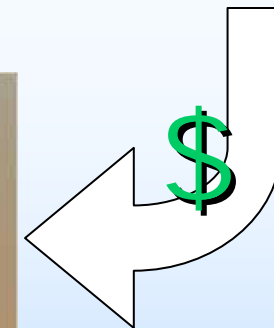
To the Utility Grid



Electricity



To Superfund Sites



Wind Farm (ref: [www.talkingtourism.co.za](http://www.talkingtourism.co.za))

# Smart Energy Resource Guide

SERAG expected to be available online by the end of 2007. Fact sheets available.

### CLEANUP - CLEAN AIR

DIESEL EMISSIONS REDUCTIONS & RENEWABLE ENERGIES

## Renewable Energy at Superfund Sites

**Fact Sheet**

**What are Renewable Energy Sources?**  
These sources naturally regenerate energy at the same or greater rate than the energy being consumed. While fossil fuels are quickly being depleted, renewable energy technology provide a lasting source of energy. This fact sheet includes information on solar, wind, landfill gas and biomass. Energy from these renewable sources can be converted into heat and electricity to power Superfund cleanup sites.

**Purpose of Cleanup - Clean Air**  
CCA is focused on encouraging, facilitating and supporting implementation of diesel emissions reductions and renewable energy technologies at Superfund sites. To accomplish the renewable energy implementation goal, Cleanup - Clean Air:  
 → Raises awareness of the need for renewable energy at Superfund cleanup and redevelopment sites, and promotes and supports Cleanup-Clean Air projects;  
 → Provides coordination and facilitation support for potential Cleanup-Clean Air projects;  
 → Creates a forum for information sharing among renewable energy advocates, and works to leverage significant new resources to expand voluntary renewable energy usage; and  
 → Implements projects and leverages funds from a variety of sources, achieves greenhouse gas reductions, and creates momentum for future renewable energy efforts within Superfund.

**Importance of Renewable Energy**  
Conventional electric generation, releases and harmful pollutant 6 billion tons of CO<sub>2</sub> from electricity generation 300 million, each carbon dioxide a by reduction from use cleanup site.

**www.cleanair.epa.gov**  
There is also much energy use at the sites in EPA's 2005 and 8 the Government Management.

**Renewable Energy**  
Solar panels on a rooftop provide a large a equipment and maintenance;  
 Wind turbines harness wind turbine provide enough energy to pay for themselves.  
 Landfill gas can be converted into electricity to power Superfund sites.  
 Anaerobic digester controlled environment be used to generate electricity.

0.5 kW PV array. Image courtesy U.S. EPA

Cleanup - Clean Air

### CLEANUP - CLEAN AIR

DIESEL EMISSIONS REDUCTIONS & RENEWABLE ENERGIES

## Clean Diesel Technologies and Alternative Fuels at Superfund Sites

**Fact Sheet**

**Clean Diesel Technologies and Alternative Fuels**  
Clean diesel technologies include new engines or retrofit devices for old engines that significantly reduce harmful pollutants, especially Particulate Matter (PM) and NOx. While newer engines will soon be mandated to be constructed with advanced control technologies, older engines run cleaner after retrofitting, replacement, or using cleaner fuels. The two most widely used retrofit technologies are Diesel Particulate Filters (DPF) and Diesel Oxidation Catalyst (DOC) devices. Alternative fuels are cleaner and cleaner fuels like Ultra Low Sulfur Diesel (ULSD) also reduce emissions.

**Purpose of Cleanup - Clean Air (CCA)**  
CCA is focused on encouraging, facilitating and supporting implementation of diesel emissions reductions and renewable energy technologies at Superfund sites. To accomplish the diesel emission reduction goal, Cleanup - Clean Air:  
 → Raises awareness of the need for diesel emissions reductions from heavy duty equipment used at Superfund cleanup and redevelopment sites, and promotes and supports Cleanup-Clean Air projects;  
 → Provides coordination and facilitation support for potential Cleanup-Clean Air projects;  
 → Creates a forum for information sharing among diesel emissions reduction advocates, and works to leverage significant new resources to expand voluntary diesel emissions mitigation efforts; and  
 → Implements projects, leverages funds from a variety of sources, achieves measurable emissions reductions, and creates momentum for future diesel emissions mitigation efforts within Superfund.

**Importance of Diesel Emissions**  
Diesel engine emitting as serious health or community. Diesel exhaust pollution is a carcinogen. Particulate Matter (PM) is the g and light and heavy particles emanate an short-term dangerous lung and heart attack.

**How can Superfund Reduce Diesel Pollution?**  
**RETROFIT** engines with emission control technologies.  
**USE ALTERNATIVE FUELS** such as biodiesel, ultra-low sulfur diesel (ULSD), liquefied natural gas (LNG), or natural gas.  
**MODIFY OPERATIONS** by reducing operating and idling time.  
**MAINTAIN** in accordance with engine manual (i.e. change air filters, check engine timing, fuel injectors and pumps) and keep engines well-tuned.  
**REPLACE** existing engines with cleaner diesel engines, hybrid or alternative fuel equipment (i.e. natural gas).

**Funding Sources**  
 • Carl Meyer Program (CA) only  
 • www.45.usdoj.gov/2002/04/04meyer.htm  
 • National Clean Diesel Campaign (NCDC) grants only  
 • Congestion Mitigation and Air Quality Program (CMAQ) grants only  
 • www.fhwa.dot.gov/congestionmitigation/

For general information visit: www.epa.gov/cleanair  
 For more information contact: 408.933.2222 (toll-free) or 408.933.2222 (local) or 408.933.2222 (toll-free) or 408.933.2222 (local)

### CLEANUP - CLEAN AIR

DIESEL EMISSIONS REDUCTIONS & RENEWABLE ENERGIES

## Clean Diesel Technologies & Alternative Fuels

**How can Superfund Reduce Diesel Pollution?**  
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**MODIFY OPERATIONS** by reducing operating and idling time.  
**MAINTAIN** in accordance with engine manual (i.e. change air filters, check engine timing, fuel injectors and pumps) and keep engines well-tuned.  
**REPLACE** existing engines with cleaner diesel engines, hybrid or alternative fuel equipment (i.e. natural gas).

**Why Use Clean Diesel Engines?**  
 • Exposure to diesel emissions such as particulate matter and nitrogen oxides (NOx) can cause serious health effects, e.g. asthma attacks.  
 • Diesel exhaust is a "likely human carcinogen".  
 • Exposure to diesel emissions is of concern for all surrounding communities.  
 • Diesel engines emit hydrocarbons (HC) and nitric oxide (NO) which contribute to smog and carbon monoxide gas.

**What are Some Retrofit Options?**  
 The most common options are Diesel Particulate Filter (DPF) and Diesel Oxidation Catalyst (DOC), both which trap soot.

Engine Type	Reduction	Cost
DPF	70-90% PM, 40-60% HC, 10-20% CO, 10-20% NOx	\$1,000
DOC	10-20% PM, 10-20% HC, 10-20% CO, 10-20% NOx	\$500

**What are Some Alternative Fuels?**

Alternative Fuel	Reduction	Cost
B20 Biodiesel	70-90% PM, 40-60% HC, 10-20% CO, 10-20% NOx	\$1,000
ULSD	10-20% PM, 10-20% HC, 10-20% CO, 10-20% NOx	\$500
Liquefied Natural Gas (LNG)	70-90% PM, 40-60% HC, 10-20% CO, 10-20% NOx	\$1,000
Compressed Natural Gas (CNG)	70-90% PM, 40-60% HC, 10-20% CO, 10-20% NOx	\$1,000

**Funding Sources**  
 • Carl Meyer Program (CA) only  
 • www.45.usdoj.gov/2002/04/04meyer.htm  
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### CLEANUP - CLEAN AIR

DIESEL EMISSIONS REDUCTIONS & RENEWABLE ENERGIES

## Renewable Energy Technologies

**How can Superfund Reduce Air Pollution?**  
**GENERATE** renewable energy.  
**CONSERVE** energy by using energy efficient equipment and lighting and reducing energy use.  
**DESIGN GREEN BUILDINGS** to significantly reduce energy consumption and costs.

**What are Renewable Energy Sources?**  
 These sources naturally regenerate energy at the same or greater rate than the energy being consumed. While fossil fuels are quickly being depleted, renewable energies provide a lasting source of energy. They include solar, wind, biomass, water, and geothermal sources. Energy from these sources can be used directly or converted into electricity.

**Why Use Renewable Energies?**  
 • Environmental cleanup systems can operate for years to decades. For longer-term cleanup systems, the groundwater pump-and-treat systems, renewable energy technologies, such as solar panels, can be used to augment the power supply.  
 • Choose renewable energy technologies for residential or commercial redevelopment projects to generate electricity on-site.  
 • Using renewable energy technologies reduces pollution and greenhouse gases from the burning of limited fossil fuels.  
 • Reduce dependence on foreign resources.

**What are some Renewable Energy Technologies?**  
 Solar panels on rooftops can provide a large amount of energy for a home or business and may make the electric meter run backwards. Cost: \$7-\$11 / watt before state and federal rebates.  
 Wind turbines harness wind energy. A single medium sized wind turbine with good wind conditions can provide enough energy for eight 3-bedroom homes. Cost: \$2,000-\$7,000 per kW (source: www.windpower.org/US/2002).  
 Biomass energy can come from plants or animal manure. Electricity can be generated from methane gas that is produced as the biomass decomposes. Cost: ~\$4000 per kW (source: www.epa.gov/2002/04/04meyer.htm).

**Funding Sources**  
 Federal, State, and Local tax credits and rebates available for energy efficient buildings and installation of renewable energy technologies. www.45.usdoj.gov/2002/04/04meyer.htm

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 For more information contact: 408.933.2222 (toll-free) or 408.933.2222 (local) or 408.933.2222 (toll-free) or 408.933.2222 (local)



# Questions and Suggestions

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[www.epa.gov/region09/cleanup-clean-air](http://www.epa.gov/region09/cleanup-clean-air)