

FOSSIL FREE BY 2033

A 7-Step Program to Save America's
Environment and Economy
(One Region at a Time)

San Luis Obispo County

Santa Barbara County

Ventura County



Community Environmental Council



“Our own energy policy has tied our hands.”

— *Richard Haass,*
former director of policy
planning at the State
Department under
President George W. Bush

Why Fossil Free by '33? Because we must.

Turn on the nightly news and chances are that one of the top stories will be about our regional and national dependence on fossil fuels. You may not recognize it right away — on the surface the story may be about national security, or melting glaciers and ice caps, or rising gas prices, or unusual weather conditions.

But look a little closer and it becomes clear: the harmful results of a century of fossil fuel addiction are becoming everyday realities throughout the world, including Southern California. Regional news stories about coastal erosion, urban sprawl, and off-shore oil drilling are all rooted in our dependence on relatively cheap fossil fuels.

As with any addiction, we must first admit the problem, then move unflinchingly toward the cure. Fortunately, technologies already exist or are quickly being developed that could truly put us on a saner energy path if the public demands it. In fact, the Community Environmental Council (CEC) believes that the solution must come locally, with locales like San Luis Obispo, Santa Barbara and Ventura counties boldly setting the tone for others around the nation. Our ambitious goal is to lead the tri-counties to fossil fuel independence by the year 2033 — just a generation from now.

The idea may sound daunting, but we believe that this region actually could meet such a target in even less time if people demanded it. This booklet outlines seven steps that could be taken to reach that goal, but it is not intended to be a definitive plan. It is meant to spark a movement and give our communities hope of creating a future without fossil fuels.

For those who would say the problem isn't that bad — or conversely, that our solution is too ambitious — let's first take a hard look at what we can expect our future to look like if we do not aggressively and immediately change course.

After reading these pages it should become clear: we choose a path of renewable energy and conservation *because we must.*

Human health impacts of fossil fuels

Respiratory problems. When exhaust from our cars and trucks is released into the air and interacts with sunlight, it creates ground level ozone — a respiratory irritant that can cause shortness of breath, wheezing, and coughing. Although these symptoms usually disappear once indoors or when the air quality improves, they can cause continued problems for those who are more sensitive — such as children, the elderly, and people with asthma, emphysema, or heart disease. What’s more, burning gasoline and diesel creates particulate matter that has been identified as the number one airborne carcinogen in California and that has been associated with heart and respiratory problems among normally healthy people.¹

Heat-related deaths and illness. According to the U.N. World Meteorological Organization, each of the 10 hottest years on record has occurred since 1990.² Many scientists expect this trend to continue if carbon dioxide and other heat-trapping gases continue to collect in the atmosphere faster than plants and oceans can soak them up. In California, average summer temperatures are expected to rise 2 to 5.5 degrees Fahrenheit by the 2030s.³ Heat waves are expected to grow more frequent and more intense — even in cooler coastal climates. Those who will be at greatest risk for heat stroke and dehydration: children, the elderly, and those who cannot afford to protect themselves.

Spread of disease. Insects breed faster and feed more in warmer temperatures, bringing insect-borne diseases with them as they expand their territories. Cases of West Nile virus were first reported in the U.S. in 1999; today West Nile has reached all but a handful of states.⁴ Other insect-borne diseases such as malaria and dengue fever may also spread.

Drought. Worldwide, regions suffering from serious drought more than doubled in area from the early 1970s to the early 2000s, with much of the change attributed to global warming, according to the National Center for Atmospheric Research.⁵ In California, short-term weather patterns notwithstanding, changes in rain patterns and diminishing snow packs are already being observed. An extended drought could have a devastating effect on food resources, drinking water supplies, and the state’s \$3.2 billion wine grape industry — including the 70 wineries located in Santa Barbara County.⁶

Citations are available at www.FossilFreeBy33.org



“Scientists increasingly believe soot to be the most dangerous air pollutant, blaming it for 64,000 deaths per year in the U.S., which is almost twice the number of deaths due to auto crashes.”

— *American Lung Association*



Environmental impacts of fossil fuels

“An ecological time-bomb is ticking away. World leaders need to recognize that climate change is the single most important long term issue that the planet faces.”

— *Stephen Byers, confidante of British Prime Minister Tony Blair and co-chair of a recent climate change task force with U.S. Republican Senator Olympia Snowe*

Air pollution. Car exhaust and sunshine add up to smog, and California has plenty of each. What’s worse, thermal inversions in many parts of the state trap the air and lead to a higher concentration of pollutants. While the tri-counties region enjoys cleaner air than its neighbors to the south, our region still exceeds allowances for ozone pollution and particulate matter. If we continue to rely on fossil fuels as our population grows, we can expect an increase in car exhaust and emissions from marine shipping in the channel, leading to worsening air quality.⁷

Water pollution. With the vast majority of tri-county residents living along the coast, we are especially sensitive to anything that affects the ocean’s health. Oil spills and leaks are two of the risks involved with fossil fuels; other risks are less visible. A recent landmark study by scientists, fishermen, conservationists, and business leaders identified a leading factor in the collapse of ocean ecosystems: toxic substances emanating from our smokestacks and tailpipes and settling or washing down to our coastal waters.⁸

Climate change. When burned, fossil fuels emit into the atmosphere large amounts of carbon dioxide and methane, the major “greenhouse gases.” While scientists don’t always agree on the details of the phenomenon, they overwhelmingly agree that we are witnessing rapid climate change due to human sources of greenhouse gas emissions. In the last century, temperatures have risen an average of one degree Fahrenheit in most parts of the world, and twice that in polar zones.⁹ As these gases continue to accumulate, we may see more “freak” weather conditions, including longer and more severe heat waves, hurricanes, megastorms, floods, and droughts.

Loss of species. Habitats change with changing climate. As sea levels rise and temperatures increase, we are already witnessing changes to entire ecosystems. Warmer oceans are killing coral reefs at an alarming rate, and glaciers are disappearing from the Andes to Alaska. Spring is arriving an average of 10 days earlier in some regions, and scientists are observing that certain species of fish, sea turtles, migratory birds, amphibians and butterflies are altering their reproductive and migratory patterns, or dying off altogether. Scientists also predict that if current trends continue, one of our most iconic Arctic species — polar bears — will become extinct within a few generations.¹⁰

Economic impacts of fossil fuels

National security. About 60% of the nation’s energy needs are met by fossil fuel imports — much of that from politically unstable regions in the Middle East.¹¹ Such dependency makes the American economy extremely vulnerable to unfriendly foreign governments, terrorists, blackmail or other disruptions in supply. In addition, protecting these resources requires military commitments that are expensive both financially and in terms of human life. Our nation’s two biggest budget items: military expenditures, and interest payments on the national debt, which now stands at \$7.6 trillion. (In less than a decade, our country has swung from enjoying a budget surplus to an annual \$424 billion deficit.) Another concern: about one quarter of our trade deficit — which now exceeds \$600 billion a year — consists of oil imports.

The end of cheap oil and gas. The phrase “peak oil” refers to the point at which less than half of the economically recoverable oil remains in the ground, making it less and less cost-effective to extract. The International Energy Agency predicts that we will reach that point between 2010 and 2020 for standard sources of oil.¹² Others extend the timeframe to 2030 or later, but concede it would occur sooner if China and India continue their rapid growth. In any case, the debate about peak oil is no longer focused on “if,” but “when.”

Economic whiplash. We know from experience that when economies grow, oil demand historically grows with it. We also know that volatile oil prices are often linked to stock market volatility. As oil becomes more expensive and eventually unavailable, we can expect to see a strong effect on our economy and other economies around the world.

Property loss & skyrocketing insurance claims. According to U.N. environmental officials, 2004 was the most expensive year ever for the insurance industry in coping worldwide with hurricanes, typhoons, and other weather-related natural disasters.¹³ Coastal communities have an added concern: sea levels are predicted to rise 1.5 to 3 feet over this century,¹⁴ and the U.S. Geological Survey has pinpointed “Southern California from San Luis Obispo to San Diego” as one of the regions most at risk from rising sea levels in California.¹⁵ Tri-county residents can expect the combination of storms and rising sea levels to threaten homes, harbors, and roads.



“In our lifetime, we will have to deal with a peak in the supply of cheap oil.”

— *Economist Robert K. Kaufmann of Boston University*

“As economists, we believe that global climate change carries with it significant environmental, economic, social, and geopolitical risks, and that preventive steps are justified.”

— *Statement signed by more than 2,600 members of the American Economics Association, including eight Nobel laureates*

Seven steps to fossil freedom

Now that the problems with unsustainable energy practices are more clear, we propose seven feasible steps to regional energy independence

Step #1: Efficiency & conservation

It may seem too obvious to mention, but energy efficiency and conservation are the quickest, cheapest and cleanest ways to extend the tri-counties' energy supplies. Simply put, the best forms of energy are those which aren't used. Many components of conservation and efficiency are attractive because they can be applied *now* in dozens of everyday ways.

Build smarter. According to the U.S. Department of Energy, smarter buildings can use up to 25% less electricity.¹⁶ Simple measures that could be applied to this region include: providing incentives to purchase more efficient appliances and home heating systems, and encouraging the use of “green building” techniques such as passive solar heating, more efficient windows, and better insulation.

Improve fuel efficiency. Tri-county residents and fleet managers can increase the efficiency of their vehicles up to 20%¹⁷ without changing engine types or fuel types. Simple measures include: ensuring that vehicles are tuned up and tires properly inflated, changing dirty air filters regularly, and using the correct grade of motor oil.

Promote public transportation. The tri-counties region could conservatively reduce its transportation fuel needs by 10% by encouraging alternatives to driving solo. Simple measures include: providing incentives to those who carpool and vanpool; increasing use of public transportation; and encouraging programs for carsharing and flexible work schedules. These strategies will also help address the region's increasing traffic problems.

Amount of tri-county energy needs that could be met by 2020 through conservation & efficiency: 17.9 billion kilowatt hours (kWh)

Citations are available at www.FossilFreeBy33.org



“A sound national energy policy should encourage a clean and diverse portfolio of domestic energy supplies. Renewable energy can help provide for our future needs by harnessing abundant, naturally occurring sources of energy, such as the sun, the wind, geothermal heat, and biomass.”

— *White House National Energy Policy: Report of the National Energy Policy Development Group, President George W. Bush*

Step #2: Wind

Wind power is the most cost-competitive renewable energy technology today, with some utility scale wind farms in the U.S. producing energy at costs lower than fossil fuel power plants.¹⁸

In northern Santa Barbara County alone, we have the potential for more than 500 megawatts (MW)¹⁹ of wind power capacity. Even if these wind power plants generated their full capacity only 35% of the time, this would produce 1.5 billion kilowatt hours (kWh) per year. If we also take advantage of the incredible wind resources off of our coast — possibly through the use of floating deepwater wind installations that are in the early stages of research and development — this region could conceivably become a net renewable electricity exporter. The problem of intermittent supply could be solved by connecting wind generators with other technologies, such as wave energy facilities, or facilities that convert energy to hydrogen.

As with all technologies suggested in this document, wind installations must be utilized in a manner that is consistent with our regions' strong environmental ethic. For example, bird deaths can be mitigated by using newly developed turbine designs and placing the installations outside of migratory routes.

Amount of tri-county energy needs that could be met by 2020 through wind energy: 11.9 billion (kWh)

Step #3: Solar

The South Coast sees the sun about 300 days per year — imagine the benefits if we captured that energy. Unlike many other technologies that require a lot of infrastructure and planning, solar panels can be installed immediately and are becoming more affordable; the average payback period for residential systems is now eight to ten years and even less for most commercial systems. Financing an installation can result in an immediate net savings, since the debt obligation can be less than the electricity bill that the new system displaces.

Convert rooftops to solar panels. Between available roof space and other unused acreage, the tri-counties could produce as much as 15% of its electricity needs — and more if we follow the lead of nations like Germany and Spain, which have recently installed large-scale PV facilities with the help of favorable renewable energy laws. As



“So many local, national and international problems flow from our addiction to fossil fuels. Our addiction has to end eventually. We can lead the way by seriously concentrating on developing our local renewable energy resources in ways that are both environmentally and economically sound.”

— *Mayor Marty Blum*
City of Santa Barbara



“It has been estimated that if less than 0.1% of the renewable energy available within the oceans could be converted into electricity, it would satisfy the present world demand for energy more than five times over.”

— *United Kingdom Marine Foresight Panel, 2000*

part of a federal campaign, CEC’s Million Solar Roofs Partnership is working to install photovoltaics regionally.

Use the sun to heat water. About 25% of the average residential energy needs are spent heating water for indoor uses, as well as pools and hot tubs.²⁰ Solar thermal technologies — which typically pay off in two to three years — could meet a significant portion of these needs.

Explore other technologies. Concentrating Solar Power (CSP) does just what its name suggests: it concentrates the sun’s rays on a liquid, heating the liquid and driving a turbine to generate electricity. Right now this technology is best suited for large, utility-scale installations. If the tri-counties devoted just 20,000 acres to this technology — 0.4% of the tri-counties’ land area — we could generate as much as 11 billion kWh per year, an amount equivalent to our entire regional electricity demand in 2004.

Amount of tri-county energy needs that could be met by 2020 through solar energy: 14.2 billion (kWh)

Step #4: Ocean energy

As an oceanfront community, it seems natural to turn our attention to the number of promising ocean energy devices being developed and tested, as long as these technologies are proved to be sensitive to surrounding marine habitats.

Wave buoys. This technology floats beneath the water, generating energy through the up and down motion of the waves. Generating 300 kW each, 1,000 of these devices along the tri-counties coast would generate about 2.4 billion kWh per year.

C-planes. Aptly named because it looks like a large airplane, this technology is essentially an aquatic version of a wind turbine that is being developed by the tri-county based Clipper Windpower, Inc. The C-plane would float offshore in strong currents, such as those found outside of the Channel Islands.

Amount of tri-county energy needs that could be met by 2020 through ocean energy: 18.3 billion (kWh)

Step #5: Hybrids, hydrogen & biofuels

More than half of the energy needed in the tri-counties is required by our cars, trucks, buses and other transportation modes. We cannot envision a fossil-free future without changing the design of our vehicles and the fuels we put in them. For example:

Hybrid vehicles. Already becoming commonplace on our roads, today's hybrids run on gasoline and generate electricity in the process — allowing them to get about 35 to 70 miles per gallon. Future hybrids will be even more fuel efficient than their cousins. If this region encouraged a large-scale increase in hybrid vehicle ownership, we could decrease our transportation fuel needs by at least 10%.

Hydrogen and hydrogen fuel cells. Pure hydrogen does not occur naturally and is not a direct fuel source because it must be derived from some other substance, such as natural gas — or more preferably, water. Once the hydrogen is created, fuel cells are one way to convert it to electricity safely and cleanly. Last year, Governor Arnold Schwarzenegger announced his plan to establish a network that provides every Californian with access to hydrogen fuel along the State's major highways, with a significant and increasing percentage of that hydrogen produced from clean, renewable sources. Our region could be part of this vision by creating large-scale wind, solar, and ocean energy facilities that convert water to hydrogen and oxygen.

Biofuels. As the name suggests, these fuels are made from living materials — usually soybeans, corn, or even wood. The resulting fuels include biodiesel, ethanol, and methanol. Biodiesel can be run in vehicles that currently run on diesel with little or no alterations to the vehicle. Flexible Fuel Vehicles (FFVs) can use either gasoline or ethanol or methanol and are becoming more common in the eastern U.S. and midwest.

Amount of tri-county energy needs that could be met by 2020 through hybrids, hydrogen & biofuels: 7.7 billion (kWh)



"I am going to encourage the building of a hydrogen highway to take us to the environmental future... I intend to show the world that economic growth and the environment can coexist."

— Governor Arnold Schwarzenegger



“If we are to be truly free of our dependence on oil in the near future, it is going to take a concerted effort on a regional scale to create critical mass in attaining the tipping point.”

— *Mayor Brian Brennan,*
City of Ventura

Step #6: Waste to energy

Technologies that convert waste products to energy are rapidly growing in Europe and are beginning to take root in the U.S. Unlike the incinerators of years ago, today’s leading technologies convert waste to energy through techniques such as anaerobic digestion, gasification, or the use of enzymes or acids.

Santa Barbara County is reviewing proposals to build a “conversion” facility at Tajiguas Landfill that would not only convert unrecyclable materials into energy, but could also mine the existing landfill for materials. The resulting facility could be as large as 12 MW and might be duplicated in landfills throughout the tri-counties.

Another increasingly popular avenue is to generate power through anaerobic digestion of animal manure or human waste to create methane, which is then burned in natural gas turbines or fuel cells. Both Ventura County and the City of Santa Barbara capture methane from waste treatment plants, preventing the captured methane from entering the atmosphere, where it would otherwise act as a greenhouse gas far more powerful than carbon dioxide. If the carbon dioxide emitted from burning methane is captured and sequestered, the cycle is completely clean.

Amount of tri-county energy needs that could be met by 2020 through waste to energy: 1.2 billion kWh

Step #7: Renewables generated by utilities

Recent California law calls for 20% of the electricity from the state’s investor-owned utilities be generated from renewable sources by 2017. We assume that the utilities will achieve this goal, and that half of the renewable energy being used by the tri-counties will come from sources outside of the region — meaning that at least 10% of our regional electricity needs will be met by renewable sources not accounted for in Steps #1 through #6.

Amount of tri-county energy needs that could be met by 2020 through renewables generated by utilities: 1.6 billion kWh

Why here? Why now? Why CEC?

The southern Central California coastal region is often described as paradise. Blessed by the sun, wind, and ocean, the region is in a unique position to demonstrate the full range of energy options and set an example of a saner and safer energy path.

In addition to our physical attributes, our region has a strong history of leading the way on environmental issues. In 1969, the devastating images of a massive spill from an oil platform off Santa Barbara's shores galvanized our community into action and caught the attention of the rest of the nation. The resulting swell of outrage and concern gave rise to the first Earth Day in 1970, as well as to the creation of the Community Environmental Council (CEC), now the largest and most established environmental organization in the tri-county region.

Since our inception, CEC has pioneered scores of real-life solutions for our community: offering alternatives to pesticides, giving support to the organic foods movement, and showcasing and promoting the use of green building techniques. Often we were among the first in the state — and in some cases the nation — to actively promote these solutions.

But perhaps CEC's best-known success has been with recycling — a bold but experimental idea that led to our establishing the first recycling center in Santa Barbara more than three decades ago. Today we can be credited with helping our city, county and eventually our state to make recycling an everyday activity for households and businesses throughout California.

Our *Fossil Free by '33* initiative takes advantage of the wisdom we've gained and the innovative toolbox we've developed. Over the next few years, the CEC plans to:

- Promote legislation and regulations that create a renewable energy-friendly landscape — in our region and at the state level;
- Promote conservation and energy efficiency in homes and business;
- Enlist the involvement of community leaders in our campaign; and
- Continue to educate the public about the problems relating to our current energy use and CEC's proposed solutions.

This can only happen if you'll join us.



“CEC has been a catalyst for positive change for a generation. I have no doubt that their vision and innovation will help us find a better and healthier way with energy.”

— Congresswomen
Lois Capps, member of
U.S. Congressional
Committee on Energy and
Commerce

The Math

Tri-counties energy needs by 2020:

- 15.8 billion kWh electricity
- + 38.5 billion kWh transportation fuels
- + 17.3 billion kWh natural gas
- = **71.6 billion kWh needed by 2020**

Sources of conservation and renewable energy by 2020:

- 17.9 billion kWh efficiency & conservation
- + 11.9 billion kWh wind
- + 14.2 billion kWh solar
- + 18.3 billion kWh ocean energy
- + 7.7 billion kWh hybrids, hydrogen & biofuels
- + 1.2 billion kWh waste to energy
- + 1.6 billion kWh renewables generated by utilities
- = **72.8 billion kWh possible by 2020**

We chose to convert all of the tri-counties' energy needs to kWhs for the simplicity of working with a common unit. For example, a gallon of gasoline is equal to 36.6 kWh and a cubic foot of natural gas is equal to .29 kWh. For a complete description of our analysis, go to www.FossilFreeBy33.org

The bottom line:

The tri-counties region of San Luis Obispo, Santa Barbara, and Ventura counties could achieve energy independence by 2020 — 13 years ahead of the Fossil Free by '33 goal — if our communities get behind it.



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For a complete description of our analysis or to participate in an online discussion, visit
www.FossilFreeBy33.org