



## *Westly for Governor, Westly for Solar*

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### **Preamble**

I focus here on California activities which are on the cutting edge of renewable energy. California has great potential, perhaps even the *greatest* potential, to overcome the energy challenges faced by humanity. I have characterized each of these as a "Photo Op" and I believe we could recruit large numbers of solar advocates to participate in special solar energy and advanced transportation events with Steve in order to draw media attention to the issue. But they could also be effective if they had to be staged as "virtual Photo Ops" in the interest of time.

While Germany and Japan have come forth with *political advances* that have accelerated the global solar market, California is still the *technology* leader. Standing alone, California is the [6th? 8th?] largest economy in the world.

A hundred years ago, long before Texas and Saudi Arabia got into the oil business, California was the world's largest producer of oil. Today California has the technological expertise and Silicon Valley manufacturing savvy to become the "Saudi Arabia" of advanced renewable energy production. The only thing standing in the way is *political advancement*.

Until we have energy-savvy political leadership in the White House, that leadership has to come from Sacramento.

It may seem that the Republican administration has done a lot -- after all, the Governor did an end-run and persuaded the CPUC to approve \$3 billion for solar, when Democrats shot themselves in the foot by voting down SB1 over prevailing wage provisions. But because of global warming and oil depletion threats, we are still doing far too little. Sweden has declared that it is going off the oil habit by 2020. [[Source](#)] Why can't California do the same (or better)?!

More on this general theme under *Solar and Transportation* below.

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### **Background**

Since there is common understanding that energy is becoming more expensive, and oil supplies could be interrupted due to political instability, a safe policy platform is to alert the public to our dilemma in terms of *energy independence*.

While the policy people know that the real challenge is oil depletion ... (after all, why would energy even be an issue if the USA had its own oil and gas reserves sufficient to meet our domestic needs for the long term?) ... it is politically savvy to ask, "How can we achieve energy independence?" Here are a couple of examples showing how this affects us all here in California:

- **Money:** The US Oil trade deficit was \$251.6 B in 2005. This is almost \$1,000 per American. Not only are we sending money offshore which comes back in the form of US assets being purchased by foreigners, we are all, little-by-little, nibbling away at our potential life savings. Instead of cycling the money around within our own communities, the money and the jobs are going elsewhere.
- **Weight:** We each consume our body weight in oil every week. To reach energy independence, we each have to cut out 60%, and more as depletion of reserves continues in the USA. We have a lot of dieting to do!

## Energy Mix

### [Graphic Overview](#)

### [California Energy Sources](#)

<u><a href="#">Electricity (2004)</a></u>			<u><a href="#">California Oil Sources, 2005</a></u>			<u><a href="#">Natural Gas (2004)</a></u>		
	In-State	80.92%	From	thousand barrels	percent		In State	15.5%
	Natural Gas	41.9%	Alaska	135,906	20.99%		Canada	24.0%
	Nuclear	12.9%	California (& minor amount from Gulf of Mexico)	240,982	37.22%		Rockies	24.3%
	Large Hydro	14.8%	Foreign	270,625	41.79%		Southwest	36.2%
	Coal*	19.8%	Total	647,513	100.00%			
	Renewable	10.6%						
	Imports	19.08%						
	PNW	6.33%						
	DSW	12.75%						

### **California Electrical Energy Consumption in 2001**

Residential	76,233	30%
Commercial	91,593	36%
Industrial	52,190	21%
Agriculture & Water Pumping	18,659	7%
Other	14,940	6%
Total Consumption	253,614	100%

## Solar Energy

### Solar Electricity

[Terminology: solar cells, solar panels, solar electric, "PV" are all better terms than "photovoltaics" -- a mouthful!]

In a world looking for more energy to meet growing demands, all the established forms and all the new forms of solar electricity are valid and important. As technology evolves there will continue to be a place for each type. The train wasn't eliminated when cars and diesel trucks came along -- trains took on a different role, handling long-distance freight and passenger service and urban commuting.

Curved solar mirrors that concentrate sunlight don't work in cloudy weather, so they are best in the deserts where direct sunlight is at its highest level. These solar thermal concentrators have the advantage of being able to store a portion of the energy produced in large insulated tanks as heat and thereby smooth out variations due to clouds or to extend generation into the early night-time, or they can be operated 24 hours a day with alternative fuels (biomass, gas or oil) during non day-light hours, thus extending their economic viability. (See more details below.)

Solar electric panels ("PV"), on the other hand, can be placed directly on buildings anywhere, from individual homes to large industrial plants, and they keep right on producing on a cloudy day.

As natural gas prices continue to rise, solar hot water heaters will also soon see a revival.

The important challenge is to assure that more and more, solar panels appear with the label "made in California." With new highly automated technology coming on line, solar can be manufactured competitively in California. And of course solar panels located in California will be installed by Californians. Imported oil means depleting bank accounts and lost jobs. Solar means jobs for Californians.

## **Photovoltaics**

- Crystalline

California has real leaders in the solar business. One company makes the most efficient commercially available cells in the world.

- **Photo Op:** SunPower, Sunnyvale

SunPower Corporation designs, manufactures and sells high efficiency solar cells and solar panels that generate electricity from sunlight for residential, commercial and remote power applications. Their proprietary all back contact silicon solar cell technology produces up to 50% more power per square foot compared to conventional solar cells. Their panels feature a unique, uniformly black design that many home and business owners prefer.

- New, high-tech thin film solar panels using the latest in Silicon Valley nanotechnology

- **Photo Op:** NanoSolar, Palo Alto

Nanosolar is on track to make solar electricity:

- cost-efficient for ubiquitous deployment
- mass-produced on a global scale

- available in many versatile forms.

Nanosolar has developed proprietary technology that makes it possible to simply roll-print thin-film solar cells that can be as efficient and durable as conventional silicon cells.

This process technology enables a dramatic increase in the process throughput and process yield possible in the production of thin-film solar cells, delivering unprecedented cost and production volume scalability advantages.

The result sets the standard for the technology and products that make it possible to put *A Solar Panel on Every Building®*.

**Competition:** [Angelides was at NanoSolar](#)

- Possible photo op: MiaSolé. I believe their manufacturing is in China but their website says "made in USA". [To be determined...]

### **Solar Thermal Electric:**

In California we have by far the largest commercial solar power facility in the world. To my knowledge, no politician has *ever* gone to that facility for a Photo Op. The 150 megawatt solar power plant is owned by the [Kramer Junction Company](#).

"These solar facilities are referred to as "advantageous peak facilities," as they operate at their peak when it is sunniest, which is also when local power requirements are greatest, due to increased air conditioning demand... The facilities regulate their power supply through the use of supplemental natural gas-fueled electric generating plants."

"A large Solar Field [could] be added on to an existing fossil fuel power plant. The solar fields can serve to boost the electricity and cogeneration capacity (power, heat and cooling) of any size plant. The temperature, flow rate, and pressure of a fossil fuel power plant can be enhanced with the addition of solar fields. Power plants are able to achieve cost savings as well as take a role in reducing global warming."



[Click on image for aerial photo](#)  
[\[a color photo\]](#)

- **Photo Op:** Kramer Junction, Mojave Desert (at intersection of US 395 and Route 58)
  - 5 fields of 33 MW each
  - Operational and commercially viable since 1985
  - Excellent reliability
  - Displaces over one million barrels of oil
  - 15 additional years working life expected

### **Solar Water Heating:**

- **Photo Op:** [Sun Earth](#), Fontana

One of the leading solar water heater manufacturing companies is in California:

"SunEarth Inc., established in California in 1978, manufactures industry standard solar water heating collectors and systems for residential and commercial applications."

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Solar is the right answer for energy independence, including:

- Pumping water for *Agriculture*
- Powering *Industry*
- Homeowners, each of us contributing our share to improve stability of the electric grid and together achieve energy independence.
- ... even transportation!

## Solar Energy and Transportation

### Background

- **Jobs:** Oil policy is not just about the Middle East. Ten years ago, in spite of its huge purchasing power as a major economy in its own right, California lost the opportunity to insist that Detroit produce a vehicle appropriate to our need for clean air. But more importantly, we lost our chance to gain jobs within the automotive market. At the time, California was, as usual, the leader in advanced electric vehicle technology. Detroit said, "We know what the customer wants better than you do."

And now ten year later, Detroit still hasn't figured out a way to solve our transportation problems. Can Californians expect something innovative from Detroit at this late date? Detroit is nearly bankrupt. General Motors had its worst year in 45 while Toyota reported record earnings.

### [Additional References](#)

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Transportation in a post-cheap-oil world poses special challenges. If non-conventional fossil fuels are untenable and transportation is powered almost exclusively by liquid fuels, it is tempting to propose biomass as a substitute for oil. In the United States, 1 billion tons of biomass are managed each year. To meet all our energy needs, 7 billion tons more would be required. [[Source](#)] Obviously, electric airplanes or cargo ships are impractical, so biomass will play an important role in our energy future. But liquid fuels exclusively from plant material will be possible for transport at only about one-tenth the present level worldwide. Something has to give.

Considering society's huge investment in the vehicle fleet and these limitations of biofuels, it is difficult to imagine the transformation of transportation to renewable energy sources. To make the shift, the premise that solar energy must be converted into fuel has to be challenged. A direct path from sunlight to electricity can be 10 times as efficient as photosynthesis. Solar energy can't be touched or put into a bottle. Solar is radiant energy, not a solid, liquid or gas.

Therefore electricity from renewables is ideally suited for urban transportation. It is nonpolluting and well-suited for fixed guide rail and automated routing of traffic, and an electric vehicle is at least twice as efficient as a gasoline vehicle. We are ready for a good reason to get rid of the internal combustion engine in dense urban areas, where it is about as practical as a campfire in the kitchen. Efficiency in the face of oil depletion is that compelling reason.

Why put our infrastructure budget into more freeways while oil prices are rising and supplies are subject to interruption due to weakening oil industry infrastructure and political risks?

## Plug-In Hybrids

- **Photo Op:** [Andy Frank](#), UC Davis.

Andy appears to contradict some of my statements but we're not that far apart.

"Recently there has been a lot of interest in the concept of the Plug-In Hybrid Vehicle or PHEV.

"There have been major improvements in the basic components, such as the batteries, the Continuously Variable Transmission or CVT, and computer control technology in vehicles.

"As a result, the technology is now ready for introduction to the mass market by the major car companies... We expect that the public will begin to demand this type of vehicle now because they have finally realized that the Hydrogen Economy won't happen in less than 30 to 50 years -- if at all. The reason is that there is no infrastructure for the efficient creation of hydrogen and the transport of hydrogen will be a problem forever. "... when using gasoline only, the [Plug-hybrid's] fuel economy is more than double the conventional car... [T]he effective gasoline mileage for a PHEV is over 250 miles a gallon. Or compared to conventional car, the PHEV will use about 1/10th the liquid fuel. This fact makes bio-fuels such as ethanol from cellulosic materials and biodiesel practical since we can supply 1/10th of our current oil energy use from croplands and waste agricultural products. In addition, as batteries improve, the electric range of the PHEV can increase, reducing the need for liquid fuel further. [Source](#)

[Other Plug-In Hybrids](#)

[More EV Companies in California](#)

## Ethanol

When the oil is depleted, ethanol may provide for some of our fuel needs but it is not a solution by itself. As stated above, all biofuel production could meet 10% of USA transportation use as now configured, but this could be improved with plug-hybrid or pure electric vehicles.

PhotoSynthesis is only 1% efficient. Solar panels are at least 10% efficient. A Silicon Valley company, SunPower, offers solar panels that are 20% efficient.

## **Advanced, Smart Transportation**

As the undisputed leaders in hybrid vehicle production, Japan has solved an energy problem, but they are still copying Henry Ford's 4-wheel design which doesn't solve our urban real estate problem.

So, fortunately, in addition to Plug-In Hybrids for the near term, there is a longer term high tech solution to our public transportation needs. As undisputed global technology leaders, Californians has answers that supercede Detroit's bungling. I'm suggesting that Steve Westly say this: "I have asked my team to work with California industry to come up with an Advanced, Smart Transportation solution that:

- reduces congestion ...
- ... while taking full advantage of our existing rights-of-way and both rail and highway infrastructure.
- delivers passengers at high speed, safely and conveniently
- builds on California's intellectual strength and high-tech industrial base.
- like computer networks, is fully accessible at low cost stations without long waits with direct non-stop routing to the passenger's selected destination.
- ...
- ...

**Photo Ops:** Irvine and Livermore

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