

# Market Driven Demise of California's Environmental Technologies

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# Why California Became the Seedbed for Advanced Energy and Environmental Technologies

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- Oil Embargos - hit hard by the oil embargos because of its reliance of oil for cars and trucks; California adopts measures to—
  - Promote energy diversity
  - Reduce reliance on fossil fuels
  - Exploit California resources
  - Reduce air pollution
- Air Pollution – California levels are worst in U.S., among the world's highest.

# Status on October 1, 1992

## State Level

- Congress has enacted PURPA, under which each state established the “avoided cost” that must be paid to non-utility generators of electricity. California established “Interim Standard Offer-4” (ISO-4).
- Interim Standard Offer 4 defines “avoided cost” in a way that some assert is overly generous, though the price is one negotiated between independents and utilities.
- Tax credits are enacted to encourage renewable energy.

# Status on October 1, 1992

## State Level Measures

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- ZEV mandate adopted by Air Resources Board
  - Starting with 2 percent of new car sales of the “Big 7” largest car makers in 1998, the mandated volume was to increase to 10 percent in 2003.

# Status on October 1, 1992

## State Level

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### ➤ California Energy Commission

- Efficiency standards form the basis of the National Appliance Energy Conservation Act of 1987 and the Energy Policy Act of 1992.
- Established largest test and demonstration of alternative fuels in light-duty vehicles, heavy-duty diesel engines, school buses, passenger vans, and fuel supply infrastructure in the nation.
- On Oct. 17, 1990 released a plan to meet almost half the state's new electric power needs with wind, biomass, solar and geothermal energy.

# Status on October 1, 1992

## Local Level

- South Coast Air Quality Management District: In 1989 adopts *The Path to Clean Air: Attainment Strategies* plan for attainment of ozone standard, described as—

a bold and comprehensive Air Quality Management Plan (AQMP) to bring southern California into compliance with federal air-quality standards by 2007. California's effort to control air pollution, as outlined in the AQMP, significantly influenced the formulation of the 1990 Federal Clean Air Act.

# Status on October 1, 1992

## Local Level

- The SCAQMD Plan requires—
  - Tier 1, Tier 2 and Tier 3 technology-based measures for reducing emissions
  - Zero-emitting solvents and coatings
  - Limit on NO<sub>x</sub> emissions from turbines of 9 ppm
- Executive Officer Jim Lents explains in a later article, “Electric vehicles are critical to healthful air” that the Plan—

squarely outlined the need for mass-produced electric vehicles...the only way the region’s notorious smog could be whipped was through commercialization of the electric vehicle. In a nutshell, the AQMD said that the electric vehicle had to become as vital to Southern California’s environment as Hollywood is to the nation’s film industry.

# Status on October 1, 1992

## Local Level

- To develop new technologies, the District's Technology Advancement Office, headed by Dr. Alan Lloyd, administers a \$10 million per year fund sustained by fees on motor vehicle registrations. Technologies supported include—
  - ultra-low NO<sub>x</sub> natural gas engines.
  - aluminum air and other battery types.
  - a wide variety of methanol, ethanol, natural gas, battery electric, fuel cell electric and other alternative-fuel, heavy-, medium- and light-duty vehicles.
- TAO funds are leveraged with contributions from other research organizations (e.g., Electric Power Research Institute), agencies (e.g., California Energy Commission) and companies (e.g., Ballard Fuel Cells).

# Results

## October 1, 1992

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### ➤ Zero emitting vehicles

- General Motors has developed EV-1 (“Impact”) battery electric vehicles that will be leased to California drivers.
- Ballard Fuel Cells and Daimler Chrysler are collaborating on development of what will eventually be the “A” Class Mercedes-Benz.
- Other ZEVs in the pipeline include Honda EV+ (1997), 3-door, 4-seat hatchback with a range of 80 to 120 miles and Toyota RAV4 EV, a 5-door hatchback seating 5, range about 100+ miles.
- Daimler-Chrysler and Ballard open in Poway, near San Diego, in 1999 what is to be an assembly line factory for light duty fuel cells.



# Results

## October 1, 1992

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### ➤ Renewable Energy: Solar

- World's largest solar thermal display, built and operated by Luz, is located in the Mojave Desert. It generates enough electricity to provide the residential needs of a city the size of San Francisco.
- The world's largest photovoltaic company is based in Camarillo. In 1990, ARCO sells its based Solar division, to the giant German conglomerate, Siemens for \$30 to \$50 million because, it said, the business was not competitive on a large scale.
- Siemens expands company sales into 110 nations. In 2002, Siemens sells the business to Shell of The Netherlands for \$500 million.



# Results

## October 1, 1992

### ➤ Renewable Energy: Wind

- More than 2,200 megawatts of wind energy capacity is installed in California—more than half of the world's capacity at the time.
- American Windpower/Kenetech, which had relocated from Cambridge, Mass. to take advantage of California's friendly regulatory climate, completes testing of its new Model 33M-VS turbine that reduces the cost of generating a kilowatt-hour of electricity from 7.5 cents to below 5 cents, making wind power cost-competitive with new systems utilizing coal, natural gas, hydropower, or geothermal energy. Kenetech invested nearly \$40 million on research and development to create the Model 33M-VS.

# Current Status

## ISO-4

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- Ten-year contracts entered into under ISO-4 expire, prices revert to market levels.
- Development of non-fossil energy supplies comes to a virtual halt.
- Kenetech enters bankruptcy as 33M-VS develops mechanical flaws.
- Luz solar thermal enters bankruptcy. SEGs continue operating.

# Current Status

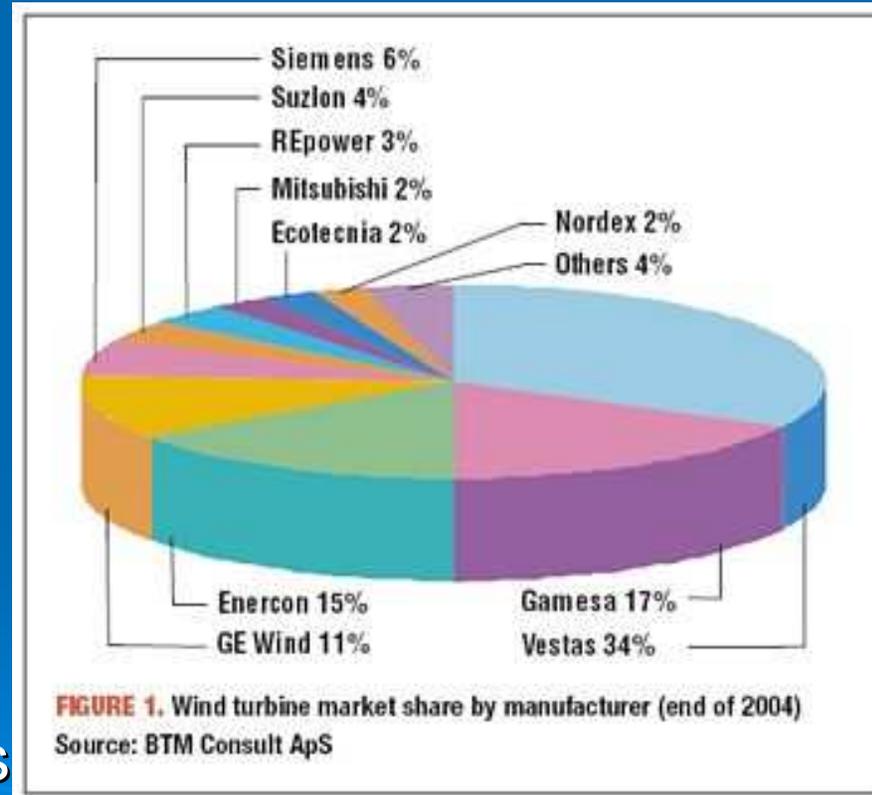
## California Wind Turbine Manufacturers

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- Wind Energy Group, Irvine
  - Carbide Burrs4less, Santa Ana
  - PacWind, Incorporated, Torrance
  - Suzlon Wind Energy Corporation
  - Clipper Windpower, Inc.
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# Top Ten Wind Turbine Manufacturers 2005

- Vestas, Denmark
- Gamesa, Spain
- Enercon, Germany
- GE Energy, United States
- Siemens, Germany
- Suzlon, India
- Repower, Germany
- Nordex, Germany
- Mitsubishi, Japan
- Ecolonia, The Netherlands



# No Comment

- SHENYANG, CHINA - June 28, 2006: GE Energy today announced the official opening of its first wind turbine assembly plant in China. Located in Shenyang, the multi-million dollar facility will provide local support for the growing wind power industry in China and Asia.
- The GE Energy (Shenyang) Co. Ltd. facility, wholly owned by GE, is designed to produce 1.5-megawatt wind turbines. The first wind turbine assembled at the Shenyang plant was completed in late March of this year, and the delivery of the first units is expected by July.

# Current Status ZEVs

- In 1996, under intense pressure by elected officials and the oil and auto industries, CARB eliminated the 1998 2% ZEV sales requirement in exchange for a “good faith effort” by the big 7 to market real-world EVs.
- In general, the MOA committed the auto manufacturers to:
  - Production of ZEVs in quantities consistent with public demand.
  - Public demonstration programs.
  - Continuing research efforts into advanced-battery powered electric vehicles.
  - Support infrastructure and rebates.
  - Support fleet usage.
- There are no ZEVs on the road in California.
- Air pollution in southern California continues to kill and sicken.

# Current Status

## Conservation and Energy Efficiency (DSM)

- The Electric Utility Industry Restructuring Act (Assembly Bill 1890) makes the generation of electricity competitive in California. The legislation became law on September 23, 1996.
  - A public goods charge was established to ensure minimum funding levels for “cost effective conservation and energy efficiency.”
- In 2000–01, an electricity crisis grips California, leading the legislature to suspend electricity competition laws.
- Electricity rates in states that adopt “competitive” market programs are found in 2007 to have risen faster than in those that retained traditional regulatory programs. California rates have risen from roughly 6.93 cents/kWhr for industrial customers to 10.49 cents/kWhr.
- The status of DSM programs remains unclear.

# Current Status Alternative Fuels

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- Methanol - no longer in use.
- Ethanol - vehicles available, but no refueling stations.
- Natural gas - widely used by transit agencies, light duty use largely eliminated.



# Current Status

## Alternative Propulsion Technologies

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- Fuel cells - a variety of vehicles, about 170 in all, are on the road in California demonstration projects.
- Battery electric - virtually all withdrawn from service.
- Optimized compressed natural gas - no longer offered.

