

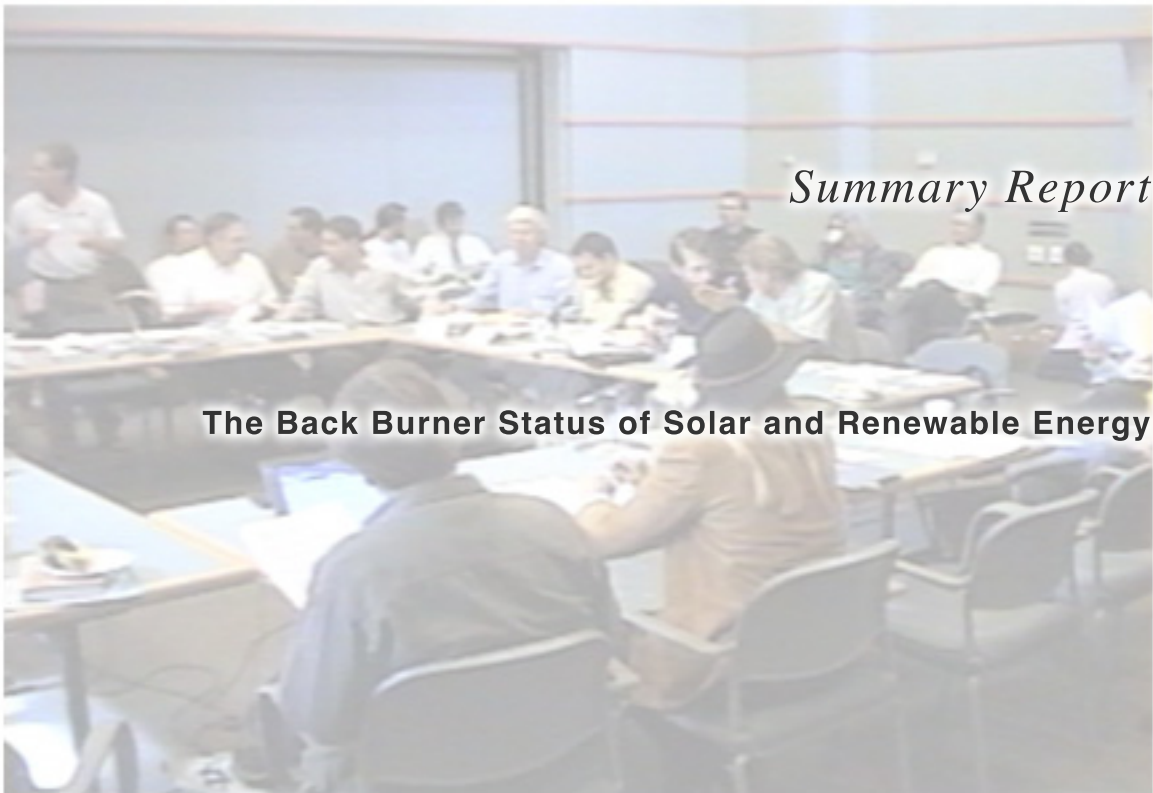
U.S. SOLAR AND



RENEWABLE ENERGY POLICY



SYMPOSIUM



Summary Report

The Back Burner Status of Solar and Renewable Energy



GLOBAL POSSIBILITIES MAY 17, 1997 U.C. SANTA BARBARA



October, 1997

Dear Readers,

When President Carter was in the administration promoting solar tax credits, I was a student of Environmental Design in New York. Solar was a hot issue and a sensible solution to our polluting industrial society. Twenty years later, we are still working hard to incorporate solar into our day-to-day lives. Last November, I founded Global Possibilities, a nonprofit organization to encourage environmental stewardship through the increased use of solar energy in the U.S. to reduce our dependency on fossil fuels.

Similar to the student that I was twenty years ago, I have immersed myself in research. On May 17, 1997, GP and UC, Santa Barbara co-hosted the U.S. Solar and Renewable Energy Policy Symposium which brought together national renewable energy experts. We discussed everything from renewable technology to international markets, environmental benefits and tax reform which is documented in the following pages.

It was clear by the end of the symposium that the key to a less dependent society on non-renewable fossil fuels is consumer education which is consistent with Global Possibilities' mission. We are working with mainstream media, academia, and other organizations to get the word out that solar is not complicated technology, it's just good sense.

I hope that you will learn as much as we have from the following pages and will support our efforts for a solar future.

Sincerely,

Casey Coates Danson
President, Global Possibilities

Table of Contents

| | | |
|-------|--|----|
| | Introduction | |
| | List of Participants | |
| I. | Renewable Energy Policy | 1 |
| | Renewable Energy Policy for a Sustainable Future | 2 |
| II. | The Renewable Energy Market | 5 |
| | The Renewable Energy Market for a Sustainable Future | 6 |
| III. | Institutional Barriers of the Renewable Energy Market | 8 |
| | Resolving the Institutional Barriers of the Renewable Energy Market for a Sustainable Future | 9 |
| IV. | Corporate Epiphanies | 11 |
| V. | The Effects of Deregulation on Electricity Companies and Renewable Energy | 12 |
| | Policies to Guide Electricity Companies for a Sustainable Future | 14 |
| VI. | Marketing Renewable Energy | 16 |
| | Marketing Renewables for a Sustainable Future | 17 |
| VII. | The Insurance Industry Meets Climate Change | 18 |
| | Renewables Meet the Insurance Industry for a Sustainable Future | 19 |
| VIII. | Education - Getting the Public Involved in Utilizing Renewables | 20 |
| | Education for a Sustainable Future | 21 |
| IX. | Practical Applications of Renewables | 23 |
| | Practical Applications for a Sustainable Future | 24 |

Appendices

| | | |
|--|---------------------|----|
| | Glossary | 26 |
| | Suggested Resources | 31 |
| | Acknowledgments | 38 |

Introduction

It is timely that this Summary Document is being distributed on the eve of the Kyoto Climate Change Conference, as the following pages provide solutions to global warming. The U.S. Solar and Renewable Energy Symposium originated as an idea between Robert Wilkinson of UC Santa Barbara and Kristin Coates and Casey Coates Danson of Global Possibilities (GP) during the winter of 1996. The Symposium was the perfect opportunity for the newly founded GP to meet the experts, become familiar with the renewable energy issues and understand the challenges. The end goal: create and initiate programs that will make a positive difference, whether it be a specific program to educate consumers on energy choices or bring energy experts, government, nonprofits, and consumers together to learn and use the same language about renewable energy use and technology for a sustainable future. In order to continue this vital exchange of information, Global Possibilities is planning to host the Second Annual Renewable Energy Symposium in May of 1998.

The Kyoto Conference on Climate Change in December is a critical step on the long path towards global climate balance. The good news is that a host of energy efficiency, renewable energy and other clean technologies are available to substantially reduce global warming emissions without impeding economic growth. Consumer activism and public pressure are essential if countries are to reach an acceptable agreement.

Sound economic and scientific analysis show that there are policy options that can slow climate change without harming living standards, and these measures may in fact improve productivity in the long run

This document summarizes nine key issues in regards to promoting renewable energy, especially solar energy in the U.S. It profiles strategies and angles by which government, electricity generation companies, the insurance industry, the renewable energy industry, and consumers can work together towards a sustainable future. Each section is briefly described in the next two pages.

I. Renewable Energy Policy:

State and federal government must design and implement energy policies that address the far-reaching economic, health, and environmental benefits of renewable energy. This can only be achieved and effective with the guidance of an educated and active consumer public. The two must work in synergy! An example is to require industry, monitored by government and the public, to reduce carbon emissions.

II. The Renewable Energy Market:

Buy renewable energy! A reliable and expanding market will lead to a decrease in technology costs. Fossil fuel dependent America should follow European and Japanese counterparts who are the leaders in the renewable energy market.

III. Institutional Barriers of the Renewable Energy Market:

The renewable energy market requires input from government, consumers, electricity generation companies, etc., to extend beyond just energy supply to address the broader scope of land use, responsible architecture, transportation systems, and the full life-cycle cost of renewable technologies.

IV. Corporate Epiphanies:

We are witnessing CEOs and company investors who no longer adhere to the thinking of “only profits matter.” Many are integrating responsible environmental and social components into their definition of “successful business.”

V. The Effects of Deregulation on Electricity Companies and Renewable Energy:

During the four year deregulation transition period into an open energy market, public and private utilities will be competing for your business. Consumers must make responsible choices and demand full disclosure of energy fuel mix.

VI. Marketing Renewable Energy:

Renewable energy needs to be seen not as an alternative energy supply, but as a qualitatively superior choice now and for future generations. Financing companies should help cover the initial investment for renewable energy technologies knowing the long term cost benefits, and developers should include these technologies in their construction package as a component of “good business.”

VII. The Insurance Industry Meets Climate Change:

The insurance companies recognize their industry is at risk due to an increased demand for higher coverage which would occur in the event of blackouts and natural disasters triggered by global warming. Increased use of renewables will reduce carbon emissions leading to global warming and provide a constant energy source in natural catastrophes.

VIII. Education - Getting the Public Involved in Utilizing Renewables:

Twenty years ago, during the Carter administration, there was a real push for Americans to use solar energy. Today we are still working to promote renewables and illustrate to the public that this technology is less complicated to understand than nuclear, coal, or fossil fuel energy, and the benefits are long lasting for our natural environment, health, and quality of life. Government, the renewable energy industry, electricity generation companies, industry, environmental groups, oil companies, and consumers need to speak a similar language about the positive effects of renewables on the state of our world.

IX. Practical Applications of Renewables:

Renewable energy is not an eccentric or “alternative” form of energy. In fact, renewables have many more advantages than traditional forms of energy which include providing a constant source of clean energy in blackouts and natural disasters, and being an economic benefit to rural economies.

As you read through the pages you will notice some words are highlighted **bold** , please refer to pages 26 to 30 for their glossary definitions. All of the participants and their organizations are listed, including other resources mentioned during the symposium in the Suggested Resources section on pages 31 to 37. We hope that you will learn vast amounts about renewable energy in the following pages, and practice some of the suggestions outlined throughout the document and on the following page.

1. Lobby and support your local and national politicians to implement responsible energy laws and policies.
2. Encourage and support electric generation companies and other energy generation service providers to implement renewable energy programs.
3. Encourage major corporations and government to use renewable energy sources in their products and services.
4. Encourage and support responsible leadership in your community, energy company, and state and national government.
5. Be flexible and adaptable to change!

U.S. Solar and Renewable Energy Policy Symposium Participants

Donald Aitken

Senior Scientist, Union of Concerned Scientists

Christo Artusio

Research Associate, Environmental Defense Fund

Ed Begley, Jr.

Actor/Activist

William S. Becker

Director, US DOE, Center of Excellence for Sustainable Development

Daniel Berman

Research Associate, Labor Occupational Health Program, UC Berkeley

Kristin Coates

Director, Global Possibilities

Steve Coonen

Vice President, Atlantis Energy

Casey Coates Danson

President, Global Possibilities

Steve DeCanio

Professor of Economics, University of California, Santa Barbara

Jim Dehlsen

Chairman of the Board, ZOND Energy

Christopher Flavin

Senior Vice President/Director of Research, Worldwatch Institute

Robert Freling

Director, Solar Electric Light Fund (SELF)

Charles Kolstad

Professor of Economics, University of California, Santa Barbara

Jeffrey Leifer

Chief Executive Officer, Leifer Capital

Amory B. Lovins

Vice President/CFO/Director of Research, Rocky Mountain Institute

L. Hunter Lovins

President and Executive Director, Rocky Mountain Institute

Don Loweburg

President, Independent Power Providers

Participants continued

Mel Manalis

Professor of Environmental Studies, University of California, Santa Barbara

Ed Maschke

Founder, California Public Interest Research Group

Michal Moore

Commissioner, California Energy Commission

Douglas Ogden

Counsel & Program Officer, The Energy Foundation

Claude Poncelet

Manager of Governmental Affairs, Pacific Gas & Electric

Barry Schuyler

Environmental Studies Program, University of California, Santa Barbara

Steven J. Strong

President, Solar Design Associates

Kathy Treleven

Assistant to the Vice President for Policy Coordination, Pacific Gas & Electric

V. John White

Executive Director and Co-Founder, Center for Energy Efficiency and Renewable Technologies

Robert Wilkinson

Professor of Environmental Studies, University of California, Santa Barbara

I. RENEWABLE ENERGY POLICY

“You have to offer something that has very high societal value that’s translated to politicians by their constituents saying, ‘I value this beyond your term.’ Conversely, you have to give politicians something that they can offer the constituents that says, ‘I’m insulated from the limits of my term by the value of this decision.’”

Moore

*“There are 100 **gigawatts** of power plants that are over 50 years old in this country. The tax codes are replete with disincentives to shut down those plants and all kinds of incentives to keep them operating. These provisions have nothing to do with environmental energy policy. These areas need to be addressed comprehensively in a symposium setting.”* Strong

- What will drive us into **renewables** is the “push and pull.” On the push side are environmental regulations, international competition and the balance of trade deficit. These are going to be the real pushes. But, the pull is going to make it happen -- the natural market drivers, the **distributed benefits** that lead us towards more favorable circumstances. An additional pull is capitalizing on public demand for building a green market. A sustainable market needs to emerge in the next four years which can only happen if it is driven by the market itself. *Aitken*
- Within a local official is contained a politician, a citizen, often a parent and grandparent, and a consumer. We need to speak to each of these roles. *A. Lovins*
- We need to combine public policy with consumer driven aspects for renewables to succeed. We are either going to let the customers do all the work and buy renewables with their **green premiums**, like the upscale organic foods analogy, or have government policy sustain it. We clearly need the two to work in synergy. *White*

- Renewable energy policies need to integrate a mitigation policy for the men, women, and children who lose from the change in the fossil fuel market. *Poncelet*
- One of the problems the U.S. has had in dealing with major policies that create shifts in our economy, is that we pay little attention to the inevitable dislocations that are occurring in the economy, which ultimately affect people. When we talk about getting off coal and oil, we need to recognize the far-reaching implications, not only to the coal miners, but to some of our state economies. *Poncelet*
- It is possible to devise policies that would accomplish, at net gain to the economy, and create the bottomline type of profit opportunities which could be achieved under “**no regrets options.**” *DeCanio*
- The Federal Energy Regulatory Commission does not consider the environment in their decision-making process. Through federal reform of the electric system, we could find ways to integrate the environment at the wholesale level by creating an environmental tracking system. *White*
- In many cases, decision makers will not consider societal values because the decision time involved in their own **discount** rate is the time between elections. *Moore*
- There’s a need for representation for the **AB 1890** implementation component from electricity generation companies, where public policy programs typically fall through the cracks. *Treleven*
- **The Public Utilities Commission** and the **California Energy Commission** did not put the effort or the political will into taking a stand behind renewables during the past 20 years. Including renewables in the mission of the state energy commissions was something that was submerged in the bureaucracy. *Moore*
- In creating policy we need to recognize that individual consumers and investors are the driving forces in building markets for the new technologies. The electricity generation companies are no longer the centerpiece of the electricity market. *Flavin*

“Why is carbon so undervalued? We are torching it in huge quantities and I suspect it is going to be valued in the near future much more than it has been as a material stock, as something to make things out of rather than to burn. We are all running around naked, trying to build bonfires to stay warm and no one has figured out yet that we can build houses out of it, put it on a sustained yield, and stay warm.” Loweburg

- A carbon tax is essentially an anti-coal tax, pro-gas tax, and a semi-pro oil tax. *Loweburg*
- We need to imagine the carbon tax as a flexible, trade-oriented instrument that’s applied differentially in the market place depending on the type of country, type of economy, and the stage of demographic and economic development. For example, we may not want to impose a tax, but instead infuse new technologies to cut down the demand for carbon generation. *A. Lovins*
- In terms of a carbon tax, the impact may be more on the institutional behavior and barriers, rather than on specific support for renewables. Therefore, carbon taxes need to be an element of policy that deals with the market if the renewables industry wants to move forward. *Poncelet*
- Even with carbon taxes, renewables could be at a disadvantage against the big gas-fired power plants because they produce relatively little carbon and have very high efficiency levels. We would have to tax carbon very heavily to have any impact. *Flavin*
- Europe has long had the perception of the carbon problem whereas the U.S. has had the perception of carbon as a non-problem. At the point when the American perception shifts, a carbon tax may be irrelevant. We have the technologies today and all we need now is the political will to overcome the hassle factor and institutional barriers. *H. Lovins*
- Beyond focusing on carbon taxes, we need to focus on very specific kinds of policy changes that are more directed at the way electric power and transportation markets work, and consequently create a sizable market for renewables. *Flavin*

- The Kyoto Summit may create momentum and the opportunity to shape national policy and response to the carbon issue. *White*
- We can encourage the shift to sustainable energy systems through carbon taxes which shift taxes away from labor and capital and onto the carbon content of fuels. Alternatively, carbon taxes could be dedicated to advanced technology buy-down funds to more directly fix the externalities from fossil fuel consumption. *Ogden*

Renewable Energy Policy for a Sustainable Future

- We must adopt state policies based on increasing the amount of renewables by a substantial percentage within a set amount of time, i.e. 2% renewables now, 5% by 2000, etc., so that all agencies must take action to help facilitate that state policy. *Aitken*
- In order to push renewable energy technologies into the market, we need more than **deregulation** policies. For example:
 - Supply-push policies which include 1) uniform environmental standards, such as new source performance review for old coal-fired power plants, 2) **renewable portfolio standards**, and 3) **system benefits charges**;
 - Distributed utility policies including 1) **net metering**, 2) **unbundling**, 3) interconnection standards;
 - Demand-pull policies including mandatory disclosure of generation mix and emissions in labels which would accompany marketing materials for all retail electricity products. *Ogden* (see Ogden, page 11)
- A challenge for renewables is to combine state and federal policy which takes into consideration the cost of money, the scale, and long-term sustained demands, so that people can build manufacturing and know they are not going to diminish their product. *White*

FACT: There are 400,000 families in developing countries around the world that have installed small scale solar home systems (20 to 50 watts which provide electricity to run a few lights, a radio, and maybe a black and white TV). Freling

II. THE RENEWABLE ENERGY MARKET

“In 1980 there were about 240,000 employees in the U.S. coal industry, and in 1994, without any carbon restrictions policies, that number was down to 114, 000. There has been a loss of about 10,000 coal jobs per year over this 14-year period. One hundred thousand coal workers should not dictate the foreign policy of the U.S. The transition needed in the coal industry could easily be cushioned by the government with transition policies, free education, and retraining type initiatives.” DeCanio

“We cannot assume that rising oil prices will create a market for renewables. The conclusion we need to draw is that conventional energy sources with which renewables compete will keep getting cheaper (subject to short-term surprises, but in the long-run we see flat or declining real prices). Efficiency and renewables, however, will keep getting even cheaper, even faster.” A. Lovins

“We are sitting here wringing our hands over a \$1.10/gallon liquid fuel while our trading competitors have fully adjusted their society and industry to the equivalent \$3.50 to \$5.00/gallon liquid fuels and they are beating our pants off. There is a big gap between what we think is reality in the U.S. and what the rest of the world perceives as reality.” Strong

- Coal miners have lost 50% of their jobs in the last 14 years due to larger machinery and cost cutting and lack of training. It may cost coal workers another 50% of the remaining jobs over the next forty years, but for every job lost, the renewables industry could create two to four new jobs. *Aitken*
- Renewable technology is here, it is not a theory. It is mature and “can uplift the infrastructure” (the technical system), through further implementation. *Loweburg*

- In the production world the problem is one of scale. The more we produce, the cheaper the price, but once we reach the target price of \$3.50/watt, volume will increase in a snowball effect. *Coonen*
- Recognize the 70-plus “distributed benefits” that typically increase the value of decentralized resources by an order of magnitude (factor of 10), making even **photovoltaics cost-effective** today. *A. Lovins* (See Rocky Mountain Institute’s *Small is Profitable* in press January 1998)

“There’s a very real risk that we will end up exchanging our present dependence on imported Middle Eastern oil for dependence on imported Far Eastern photovoltaics. The Japanese government has committed major domestic resources to a distributed market in roof top photovoltaics. This year alone, they will install 40% of the world’s production on residential roof tops with a 50% subsidy.”

Strong

- In Europe there is a more decentralized development of renewables which is much more oriented *towards* utilities rather than having to work *through* them. There is a direct link to the ultimate producers and consumers. *Flavin*
- Sustained federal commitment of policy and budget to create portfolio standards is lacking in this country. European counterparts are already creating portfolio standards which are driving the building application market in places like Switzerland and Germany. *White*
- Public support for renewables in Europe is very strong and we need to replicate this kind of support in this country. *Flavin*

The Renewable Energy Market for a Sustainable Future

“Why hasn’t the renewable industry moved very far in the past twenty years? Real decisions must be made and the public must be involved in them or we will find ourselves having this same conversation in another twenty years.” *White*

- In order to create sustainable systems for the future, we need to: 1) look at energy in a broader context, i.e. transportation, industrial and residential electricity, land use, 2) create sustainable policies that are *for* something rather than against something, and 3) collaborate with the global economy to learn from other countries. *Poncelet*
- Benefits of economic development and job creation in the renewables market need to be quantified. When we can measure these economic benefits and put them right against other economic aspects of the way a state operates, we will have more leverage. *Aitken*
- The legislature could make a real commitment to renewables by subsidizing initial capital investment! *Flavin*
- We need to look at communities for the comparative advantage of renewables that can be exploited. For example, **SMUD** has a real strong geographic niche that they can fill with **PV** because of location and a supportive community. *Moore*
- Ten **megawatts** out of zillions of megawatts is so small for the electricity industry and so huge for the renewables industry. If we could double the amount of renewables, our prices would be consistent in the U.S., and consequently competitive. *A. Lovins*
- In Europe, social taxation roughly doubles the cost of hiring people which leads to high unemployment. One way to relieve unemployment is to implement ecological tax reform that shifts taxes from employment and income to resource depletion. The reform demands taxing more what we want less of, like carbon, and taxing less of what we want more of, like income and jobs. *A. Lovins*

FACT: "Renewable technology is now fairly competitive with conventional energy and is booming around the world. Last year there were about 1200 megawatts of wind power installed worldwide." Dehlsen

III. INSTITUTIONAL BARRIERS OF THE RENEWABLE ENERGY MARKET

“I think it may be worthwhile to make a distinction between organizational failure and marketing failure. The fact that the prices aren't right and decisions aren't socially optimal, is not an example of market failure. The fact that companies don't make profitable investments is not a market failure, it's an organizational failure. Markets are generally very good at allocating resources in the sort of anonymous transactions that take place within markets. But within organizations and political bodies, the failure of people to come up with the right policy is endemic.” Flavin

- If the coal industry in the U.S. faces a challenge it might be incumbent upon us to talk to the workers that are effected by that change directly. Securing their pensions as part of our agreement might be a way of reaching out and changing the policies in some of those states. *White*
- It is our civic responsibility to recognize the various institutional barriers in the government, and create programs to help clear them to assist the renewable market. We also need to recognize that the market cannot and never was designed to talk to us about things that really matter. **We need to help define the role of government in the renewable market.** *Moore*
- It's important to look at energy versus electricity. If we only focus on electricity, we miss an important link -- transportation systems which drive land use and ultimately energy consumption. We can help the market get to renewables by focusing on the transitions rather than the end states. For example, a hybrid car which is part **EV** and part gas (regenerative cars) can accomplish the end goal to cut consumption and create more efficient vehicular transportation. If we do it in the context of a better land use system, a better transportation system, this could be an effective interim step. *Moore*

- It is not price and technology that stand in the way of vernacular photovoltaics and distributed systems, it is simply institutional barriers, specifically, the lack of net metering and uniform interconnection standards. *Strong*
- The non-political sphere, the sphere of actual engagement between the public interest and corporate sector, is far more important than the whole political business that we are all so trained to focus on. Currently, elected leaders are not focusing on new electricity technologies, perhaps due to the fear of losing the coal and oil states' support. *White*
- The government structure needs “to be shaken to its core.” The policy makers don't have the political will and it's easier to play a shell game with the public because of term limits, campaign contributions, and the “dance” they do with the public so they can move to another office in four to six years. *Maschke*
- We often believe we will not live to see the benefits of sustainable development because it's too far into the future, but we need to do a better job modifying the one, two, and four-year benefits to sell it to the politicians. *Moore*

Resolving the Institutional Barriers of the Renewable Energy Market for a Sustainable Future

- Create a huge renewable energy market by forming an electricity buyer's club with membership databases from organizations such as the Sierra Club, Natural Resources Defense Council, the **Public Interest Research Groups**. *A. Lovins*
- Create a single national environmental database that would be the generators' common reporting form for environmental information as they generate electricity, so we can find out what's actually being generated in terms of renewables. *White*
- If the benefits of renewables can be quantified in the present price context, we need to recognize the political, psychological, and organizational barriers preventing us from taking advantage of these opportunities. *DeCanio*

- We need to deliver services to the end user and make sure that our information gets to them. In other words, passive solar design should be a standard of good architecture rather than a special feature, thus making responsible design both environmental and “transparent.” *H. Lovins*

FACT: The entire renewables industry is smaller than most Fortune 500 companies. Coonen

FACT: Annual worldwide PV power is less than 100 megawatts, and 100 megawatts is minuscule, as compared to one PG&E nuclear power plant which generates 1000 megawatts. Coonen

IV. CORPORATE EPIPHANIES

“We are on the verge of a second industrial revolution. In the future, the companies that are going to prosper are those that are going to pursue resource efficiency and total factor productivity. That’s the competitive advantage, coupled with tax shifting and a broader corporate definition, of what being in business is. There is a dramatic shift in thinking and it’s not the Age of Aquarius, it’s for very pragmatic economic reasons coupled with real constraints of the biosphere.” H. Lovins

- CEOs of major companies are having life-changing attitude shifts. A whole company can change direction, and not necessarily for economic or rational reasons. *H. Lovins*
- British Petroleum CEO, John Browne, announced a new policy to support curbs on emissions of carbon dioxide and to create new ventures into the renewable energy market. *Aitken*
- We need to help CEOs of major corporations understand how the world works: that everything they do not only intersects with the world but depends on the world, that their present and future economic well being depends on understanding the world, and figuring out how to work within the world’s natural systems and functions. *Aitken*
- Epiphanies in the financial community depend on how Wall Street values responsible business, whether it’s environmental performance or it’s innovation in their businesses, in terms of sustainable development. How can Wall Street bring this kind of value into what a stock is worth, -- what credit can you get? *Poncelet*
- It is politically acceptable to endorse renewables and CEOs are seeing the light. The consensus is that the public needs to take action on green pricing to make the first transactions happen. *Dehlsen*

V. THE EFFECTS OF DEREGULATION ON ELECTRICITY COMPANIES AND RENEWABLE ENERGY

“We need to bring the utilities along, and there’s a long distance along the spectrum between the typical Neanderthal position of some utilities and SMUD which are pushing the envelope and leading the world forward. We certainly cannot sit back and wait until the utilities get vision relative to distributed renewables because it’s simply against their primary business interest and instincts to do so. We need to lead them.” Strong

“Do we expect industry to ween itself off fossil fuel energy supplies during the deregulation transition and become competitive? Yes. Do we expect this by the end of the 4 years? Yes, because we don’t think anyone has any choice. ... so, I have to assume that there’s an absolute cliff at the end of the 4 years and anyone who isn’t market competitive dies.” Moore (In reference to the California deregulation process outlined in AB 1890; please refer to the glossary)

*“Once you start unbundling prices and going to **“real-time,”** and permeating the whole system with real time price information, many kinds of economic rewards accrue to distributed resources which before were simply notional and you couldn’t really make money on them.” A. Lovins*

- \$540 million has been reserved by the California Energy Commission for the first 4-year transition into state energy deregulation. Of those funds, 45% will go to renewables, 30% will go to new technologies, 10% to emerging technologies (mainly photovoltaics), 15% to 16% will go to consumer accounts, and 1% will go to an energy advisory board. *Moore*
- Deregulation has inadvertently forced key decision makers to put renewables on their agendas. This is truly an opportunity for local governments to take leadership roles. In dealing with local governments, we have to make the language comprehensible, so we can take it from technical to literal, sharing the politics of the day-to-day realities of renewables with county supervisors and city council people. *Leifer*

- There is a four year deregulation transition period that electricity generation companies are looking at as a consequence of AB 1890. The real challenge comes from making it work and making it productive in the years after the transition. *Moore*
- As electricity generation companies go through the deregulation transition, the important issues will be pricing reliability, technology, and the fact that renewables will be a commodity for natural disaster emergencies (power reserves). Renewable-based electricity companies must prove themselves in the next four years for long-term growth. *Moore*
- Decentralization of electricity generation companies must happen or there will only be large monopolies running the country's electricity. The only remaining electricity generation company will be a distributed utility. *Wilkinson*
- **Distributed generation** is actively being lobbied at this time. This term only applies, however, to the monopoly electricity generation companies. The term "competitive generation" is more appropriate when considering renewables. *Loweberg*
- From a electricity generation company standpoint, the difference between expenditures and revenues is the limited amount allotted for absorbing the **stranded costs** caused by fluctuating gas prices, lack of rain for hydro resources, etc. The shareholders will ultimately incur the expense of these stranded costs. *Treleven*
- Feed laws: What we do in California is the standard. We offer contracts that basically guarantee a platform long-term contract and guarantee a fixed energy price over a period of time. In the case of California, the situation is 10 years and 20 years of capacity payment. What they have done is guarantee a platform under which the renewables can participate. *White*
- The Electricity Feed Law in Germany established standard minimum power purchase prices so that potential generators using renewable technology do not have to negotiate each project with electricity generation companies. The Feed Law has driven the German renewables market to number one in the world. As a result, German taxpayers subsidize renewables at the same level as coal generated power. *Flavin*

- When comparing municipal to public or private electricity generation companies, there is no correlation between the quality of decisions and the form of ownership. What matters is the quality of management that makes an organization accountable to its constituents, no matter how large or who owns it. *A. Lovins*

Policies to Guide Electricity Companies for a Sustainable Future

- We also need policies to maximize the demand-pull for these resources, including disclosure of the generation mix and of the emissions of that mix, so that consumers can see what it is they are buying. A label, like the food label, that shows the percentages of coal, nuclear, gas, and renewables, with a certification stamp on the renewables portion, so that consumers can have confidence that any premium they are asked to pay actually goes to “green” resources. *Ogden*
- Net metering, and rewarding electric utilities distributors for cutting customer bills rather than for selling more energy, are the most significant and necessary prerequisites for electricity generation company restructuring. *A. Lovins*
- We need to maintain and increase air emissions standards on generation companies, and provide information to consumers in the form of mandatory disclosure labels that reveal the emissions of power plants. Emissions disclosure could assist consumers in deciding which companies should get their electricity dollars. Emissions disclosure could also pave the way toward environmental dispatch, so that the independent system operator, given an appropriate economic or political signal, could dispatch electricity in a manner that reduces pollutants. *Ogden*
- The “Plug-In Green Power Campaign” sponsored by **Center for Energy Efficiency and Renewables Technologies (CEERT)** is a pre-marketing campaign for the January start-up competition of California to help educate people on their electricity options. *White*

FACT: The average U.S. electricity generation company spends a little over half its annual investment on the grid. In the west where there is the most growth, the figure is more like three quarters going to the grid. A. Lovins

VI. MARKETING RENEWABLE ENERGY

“Photovoltaics will not be sold because they are “green”, but because they are simply more desirable products. Consumers buy CDs over vinyl records, and renewables and end-use efficiency can be sold in exactly the same way without making energy an issue at all. We can more effectively sell renewables on the premise that they offer qualitatively superior services, not just because they save energy costs.” A. Lovins

- Energy efficiency will be attractive to the buyer because it provides qualitatively superior service at a lower price. Renewables will be bought for similar reasons because they provide dozens of distributed benefits. Fossil fuels are not nearly as inexpensive as they appear due to fuel price volatility. *A. Lovins*
- SMUD was able to rally base support from the public to use photovoltaics by communicating on a grassroots level in a way that brought the technology down to earth for real life applications. Sacramento demographically is not much different than other cities in California or throughout the U.S. *Coonen*
- If the public is willing to pay a green premium because we successfully show the value of renewables on a broader scale than just energy and because it relates to a number of social goals, then the constituents may push for legislation to support additional programs beyond the deregulation transition. *Moore*
- To maximize the demand-pull from green marketing, mandatory disclosure labels are needed. In focus group research, several **Energy Foundation** grantees have found that consumers want to see a breakdown of fuel mix and emissions from their retail electricity provider. Although consumers may not yet understand the terms SO₂, CO₂, and NO_x, or particulates, they have stated an interest in learning about the emissions that result from their electricity consumption. A parallel can be drawn to food labels: during initial Food and Drug Administration focus groups, many consumers did not know what a carbohydrate is. Over time, many have learned from food labels that carbohydrates are sugars. *Ogden*

Marketing Renewable Energy for a Sustainable Future

- We need to treat the public with dignity and the credit they deserve by communicating our need to support the world for future generations, rather than playing down to the least common denominator. *DeCanio*
- There are buyer cartels around the world being organized that require certification of sustainable forestry practices. Since large amounts of Canadian foreign trade is connected with forestry, they've made it their business to aggressively pursue this with certification and actual delineation of what they really mean by sustainable forest practices. The renewables industry could pursue buyer cartels in a similar fashion. *Manalis*
- Photovoltaics should be integrated into a standard loan package, making its financing as fundable as other parts of the mortgage fee. *A. Lovins*
- Sunny Mae Solar Financing Program: We clearly need a marketing program that gets builders, appraisers, lenders, all to see PV as a perfectly logical and important component of construction. Instead of penalizing the borrower by making it more difficult for him/her to qualify, you recognize that a borrower won't have as large a electricity bill and will be able to afford a higher monthly payment. This kind of proposal is just now moving forward, and has been modeled on support by sponsors of the Solar Bank idea of the World Bank. *A. Lovins*
- We need to develop a user-friendly vernacular PV that can just plug in the wall, rather than a complicated assembly of systems. *A. Lovins*
- Members of the Church of Jesus Christ of Latter Day Saints lay away a one-or two-year supply of food for catastrophes and should be equally interested in renewables, notably photovoltaics, as part of their self reliance plan. *A. Lovins*

FACT: The German renewables market is the largest in the world. Flavin

VII. THE INSURANCE INDUSTRY MEETS CLIMATE CHANGE

“The environment, particularly the global climate system, has a value to our well-being and our standard of living which is worth preserving.” DeCanio

“Anytime we use energy, regardless of where it comes from, it goes into heat in the earth. There’s a radiated equilibrium with the universe and it has to get rid of that heat, and the perimeter of dictating that is temperature. This is the First Law of Thermodynamics.” Manalis

“Think of the impact on a community and how long the aftershock of a disaster lasts. The insurance industry and all the businesses that are harmed by disasters, and communities that are acting on their behalf, have a big interest in getting power up quickly.” Becker

*“The premium you have to pay for energy insurance price protection against the volatility of fuel and power prices is the value that renewables bring by being a **constant price resource**. Americans also spend over \$5 billion a year on equipment to improve power quality, for example, to run their computers. This is a measure of the market value expressed in actual purchases of a highly reliable, high-quality power resources ...” A. Lovins*

- Frank Nutter of the **Reinsurance** Association of America claims that 21 out of the 25 biggest U.S. catastrophes have happened in the last decade. Of those 21 disasters, 15 or 16 had to do with wind and water most likely triggered by global warming. *Begley*
- Frank Nutter of the Reinsurance Association of America is in favor of validating the linkage between climate change and natural disaster, but he’s frighteningly alone in this country. **The Center of Excellence for Sustainable Development** is bringing together European and U.S. insurers to help them understand this linkage. *Becker*

- The Center of Excellence for Sustainable Development is working with the insurance industry to prove that efficiency and renewables can take losses out of the system. In negotiating with insurers, they are beginning to recognize this in their rates, investment policies, and what they do in their buildings. *Becker*
- **Environmental externalities** of fossil fuels are not being priced correctly, and social welfare could be improved if those externalities were included in the bottom line type of profit opportunities which could be achieved under no regrets options. *DeCanio*
- The insurance and reinsurance companies are financially larger than the coal, oil, and gas industries combined. *A. Lovins*
- In natural disasters, 20% to 30% of the insured losses are due to the interruption of life-line services to businesses and other enterprises. About 50% of the businesses that close in a natural disaster, never reopen. *Flavin*

Renewables Meet the Insurance Industry for a Sustainable Future

- The life insurance industry owns about 20% of all the commercial property in this country. This represents a tremendous opportunity for renewables if they converted their properties. *Flavin*
- With increased predictions of large scale blackouts in the west, the public will be more likely to invest in renewables. *A. Lovins*
- We need to quantify the benefits of risk coverage so we can move into using renewables to substitute for financial instruments. *Aitken*
- Price risk insurers and underwriters will want to buttress price insurance policies like contracts for difference lending to a mixture of financial instruments (i.e. futures, options) with physical assets that can do physical delivery of constant-price energy. These are commonly known as a renewable resources. *A. Lovins*

VIII. EDUCATION - GETTING THE PUBLIC INVOLVED IN UTILIZING RENEWABLES

*“The thing we have all failed to do in the last 20 years is get the message out enough and to get the grassroots revolution fired up enough. That’s where the change could have occurred and was beginning to. We need to begin to involve the public on a mass basis if we are going to regain what we had 20 years ago ... and that was leadership in the world in terms of production for the future of solar energy, and for this **soft energy** package.” Maschke*

“... in the process of doing the California restructuring we have set in motion, for better or worse, forces that we now have to take advantage of. These forces involve empowering individual citizens and customers to participate in an active debate about where their money goes -- into what kind of producers, distributors, and service providers they will spend their money on.” White

“Public participation is the ultimate driver of the renewables market. Getting an educated public, however, is a tall order, especially since everybody’s buying 4x4s out there and energy is the last thing on people’s minds.” Ogden

- The public needs to become educated about clean energy technologies as the least-cost approach to global warming mitigation. We can cut carbon emissions, and grow the economy at the same time through utility regulatory restructuring to encourage energy efficiency and renewable technologies, strong building codes and equipment standards to encourage energy efficiency, advanced vehicle technologies such as electric and **fuel cell** vehicles to cut demand for fossil fuels, and transit systems and land-use planning that encourages in-fill development and reduces vehicle-miles traveled to cut demand for fossil fuels. *Ogden*

- We must take advantage of this administration to focus on solar tax credits, education, and responsible design standards for virtually all building in this country. *Danson*
- What can we do to raise public awareness and understanding of issues such as climate risk, especially in the face of the kind of deficiency in scientific literacy that we seem to have inherited as a society? *A. Lovins*

Education for a Sustainable Future

“We are fraught with possibility and the future is in our hands. It’s in our shaping, but we are not going to do it alone and so I implore you to do what you can in your own communities. Take the message back and give it to more people because that’s how we’re going to succeed. We will never succeed from ivory towers.” Maschke

“Our problem is finding a way to mobilize citizens to not be against things, but to be for things and stay with us over time. I think that’s a part of why decentralized community empowerment is one of the goals we ought to be looking for in this debate.” White

- One of the most powerful forms of communication in the world is the electronic media and it needs to be used to get the word out. *Begley*
- Communities need to work at a group level to purchase neighborhood solar energy systems. This kind of political activity will strengthen us for the sustaining fight at the national level so we end up with good policy. *White*
- Communicate with diverse businesses (Fortune 500s) at their level, a consumer level, and from an environmental point of view, to build consumer groups that represent the ultimate purchasing public. *Flavin*
- Communication to local officials is needed on why discounts and sustainable development are important to their region. *Becker*

- Build coalitions with other individuals across the country who are also working for clean power campaigns. CEERT provides a web page (cleanpower.org) for people to sign in electronically and take a “cleanpower pledge.” *White*

IX. PRACTICAL APPLICATIONS OF RENEWABLES

“Wireless power and wireless communication allow people to stay within their local village, close to nature, and maintain communal ties to the rest of the world.” Freling

- There is evidence that people work better in **daylit** offices, and buy more in daylit stores. An example is a comparison of two green Walmarts designed by William McDonough, Dean of Architecture, University of Virginia, in which sales went up 15% as compared to other Walmarts that were not daylit. *Aitken*
- Offices with better thermal, visual, and acoustical comfort have a roughly 16% higher labor productivity. In offices you pay 100 times as much for people as you do for energy. A one percent gain in labor productivity, therefore, would have the same bottom-line benefit as eliminating a whole energy bill. *A. Lovins*
- In the West, where land has been leased for wind turbines, the resale value of that land has sometimes increased by \$3,000 to \$4,000 per acre as a result of the reliable income. This is a real economic benefit to rural economies outside of all of the economic considerations. Wind development could be an economic boom to farmers as well because it only takes up 5% of their land for the turbines and roads, while they can continue to farm the remaining 95%, often doubling their income from the reliable wind lease payments. *Aitken*
- **The Department of Energy, Center of Excellence for Sustainable Development**, works with communities to encourage sustainable development including solar technologies for disaster-affected communities. *Becker*

One way to make renewables cost-effective is to integrate renewable energy systems as a component of a house in the construction phase to be purchased as part of the whole package. **Atlantis Energy** is currently supplying fifty houses with a roofing tile that goes in as a new product during the construction phase of a standard subdivision outside Sacramento. *Coonen*

- Hypercars are aerodynamic, ultralight, hybrid-electric cars. A fuel cell hyper car becomes a mobile, 20-kilowatt power plant which is driven 4% of the time and parked 96% of the time. You drive it to work, plug it into the hydrogen and electric

hook-up, and it then sends 20 kilowatts quietly back to the grid while you are sitting at your desk. That will earn roughly half the lease fee by keeping busy and productive your previously idle, second-largest household asset. The hypercar fleet, when fully built, will have five times the generating capacity of the national grid. *A. Lovins*

- To make hydrogen power economical for cars, you begin by putting fuel cells in buildings which use two-thirds of our electricity. The fuel cell's 70°C waste heat then provides building services that are typically worth about enough to pay for the fuel, yielding a net delivered electricity cost around 0 to 2¢/kW-hour. That highly competitive price opens up an enormous fuel cell market, creating higher production volume and hence, lower costs. *A. Lovins*
- If the electricity generation company owns the fuel cells and leases them for buildings and cars, then they can control where the fuel cells go and put them in places that best capture the biggest distributed benefits. We will then discover that most renewables can make hydrogen more economically than they can make utility-grade electricity. Hydrogen is easier to store, easier to transport, and we can use the “God” electricity generation company to do the distribution alongside the other two distribution infrastructures we already have -- namely the electric and gas grid. *A. Lovins*
- Big multinationals such as Mitsubishi, Sony, Dow and the Big Three U.S. car companies, oil companies, and polymer companies are developing fuel cells. *A. Lovins*

Practical Applications for a Sustainable Future

- Scenario: A weather driven power outage occurs at 3 a.m. Utility service people in heavy rain gear are hopping over back fences with flashlights looking for disconnects in the neighborhood. Solution: An inverter with a built-in isolator, so when the grid goes down it automatically isolates and runs the load without interruption. When the grid comes back up, it detects, resyncs, and reconnects. We should work for this to become an industry standard and state guideline. *A. Lovins*
- Scenario: Currently public city lighting is connected to the electricity generation company grid which requires labor for connection and meter reading. Solution:

Increased use of photovoltaics is several thousand dollars less expensive than connecting alley lights to already existing wires. This can also improve stability and grid management. *A. Lovins*

- Consider the grid as a toll service, as a common carrier, which involves pricing with locational and temporal rents that amount to congestion rents. Distributed resources will start to get rewarded for what might be called “Grid Dristan” where they will earn a decongestant rent wherever making power near the load center at the right time can free up congested grid resources for other valuable transactions. *A. Lovins*
- In building a house, you could have a PV-powered dedicated circuit in several rooms which would run your computer, refrigerator, radio, and charge back-up batteries in a power outage. This could be a real marketing feature for house construction and sales. *A. Lovins*
- Photovoltaics are a much more resilient form of electric power than centralized power. If we could prove this to the insurance industry, we could persuade them to begin investing in distributed power and create another market. For example, Steamboat Springs has an early warning disaster detection system -- a PV monitoring device on a river that goes through the community which warns them when water levels rise and triggers a device that diverts the river elsewhere. *Becker*
- If we employ our local renewable resources like hydro, wind, solar, etc., the macro capacity electricity providers (nuclear power plants) will shut down because we can no longer afford to maintain them. The hydro dams will turn into hydrogen vendors because they can get the equivalent of 9 to 12 cents/kW-hour selling vehicular hydrogen instead of electricity. This represents a lot of marginal capacity. *A. Lovins*

GLOSSARY:

AB 1890 - Deregulation of the Electrical Industry

AB 1890 was prepared in 1996 to deregulate the electricity industry. This legislation has six key areas: 1) dismantling California's electric monopolies, 2) maintaining California's competitive edge to spur job creation, 3) lowering rates and cutting costs for consumers and businesses, 4) maintaining reliable and efficient power sources for all Californians, 5) supporting energy efficiency; research, development, and demonstration, and low-income assistance programs, and 6) integrating municipal electricity generation company districts.

(derived from "Fact sheets on AB 1890 from the Office of Governor Pete Wilson," September 23, 1996)

- Assembly Bill 1890 will allow some California electricity companies to bill ratepayers (rather than shareholders) for almost \$30 billion in bad nuclear plant investments. The price tag will be \$844 per capita or \$3,375 per family in California through the year 2001. While residential ratepayers are supposed to get a 10% reduction in rates in January 1998, that reduction will be paid for with \$5 billion in state-guaranteed CA Infrastructure Bonds. In effect, the legislature was forcing taxpayers to lend money to the utilities in order to give those same taxpayers a rate cut. AB 1890, according to economist Eugene Coyle, constitutes "a 2-to-4-cents-per-kilowatt-hour hidden tax that all Californians will pay directly to private-utility stockholders over the next decade."

(derived from Who Owns the Sun, by Daniel M. Berman & John T. O'Connor, 1996)

- *avoided cost*: the cost that electricity generation companies can avoid by purchasing for independently-produced power rather than making its own. In principle, electricity companies are supposed to offer to pay for the private power production.
- *Constant Price Resource*: renewable energy sources, once installed, produce energy at a constant price because they use no fuel whose cost may vary over time. This is analogous to Treasury Securities that yield constant financial return with zero risk.

- *cost-effectiveness*: an economic measure of the worthiness of an investment. If an innovative solution costs less than a conventional alternative, it is more cost-effective.
- *daylit*: illuminated by carefully distributed natural light to replace artificial lighting.
- *deregulation*: actual “restructuring” of the scheme for delivering electricity from generator to customers into separate functions, some of which will continue to be regulated. Generation will be fully deregulated and open to competition, while transmission will be operated by a regulated independent operator to serve all equally. Distribution will be highly competitive as distributors vie for your business with those nasty evening and weekend telephone calls, but it will also be regulated to provide equal access to benefits by all classes of customers to prevent market abuse and to require disclosure of the portfolio that is being offered.
- *distributed benefits*: Utilities can benefit from maximizing utilization of the existing investment in the distribution system, i.e. substation transformers and energy distribution lines, to minimize new investment requirements, i.e. implementing the use of renewables. Economic engineering, environmental and other social benefits of making, saving, or storing electricity at the right scale for the job. There are dozens of kinds of such benefits, but none were counted in traditional electricity companies between different kinds of central power stations.
- *distributed generation*: decentralized electricity generation -- photovoltaics on individual roofs.
- *EV*: (electric vehicle) a vehicle whose wheels are driven by electric motors; the electricity can be stored by on-board batteries recharged from the grid (or by solar cells), or can be made on board from fuel (this is a hybrid-electric vehicle).
- *environmental externalities*: the costs and benefits to society of electric power generation which are explicitly not accounted for in electric rates.
- *fuel cell*: invented in 1839 by British scientist, Sir William Grove, who found that combining hydrogen and oxygen in the presence of an electrolyte produced electricity and water. It is a simple technology that produces electricity with hydrogen without combustion or emitting anything more troublesome than water

vapor. Applications of fuel cells range from powering automobiles to submarines to creating electricity for power plants.

- *gigawatt*: one billion watts, a measure of instantaneous capacity to deliver power. (Power is the rate at which energy is used.)
- *green pricing*: solar energy can be paid for by consumers who voluntarily agree to pay a premium of a few dollars each month for “green” electricity in some form.
- *grid*: an electricity generation company term for the network of transmission and distribution lines that carry electricity from a variety of sources across a large area.
- *hidden costs*: costs that are hidden in the sense that they are typically spread across a number of electricity generation company cost-accounting categories making them somewhat difficult to aggregate and include in the total cost of system-wide generation capacity.
- *IRP*: Integrated Resource Planning: considering and fairly comparing all ways to deliver a desired energy service, whether by producing more energy or by using existing supplies more productively.
- *kilowatt*: one thousand watts, a measure of instantaneous capacity to deliver power. (Power is the rate at which energy is used.)
- *megawatt*: one million watts, a measure of instantaneous capacity to deliver power. (Power is the rate at which energy is used.)
- *negative discounting*: putting more value on the future than the present.
- *net metering*: using the existing standard customer meter to monitor the flow of electricity to and from the grid. The meter spins backward when the PV generation exceeds the home’s load and flows to the electricity generation company grid. It spins forward when the customer’s load is not being met in full with PV generation. If the customer was a net consumer of electricity, the bill for the excess purchased is paid at the regular retail rate. If the customer was a net producer during the billing cycle, the customer is reimbursed for the excess sold either at the utility’s “avoided” cost, or at a more favorable cost set by law for that State.

- *No Regrets Policy/Options*: ways of protecting the climate (chiefly by reducing carbon emissions) that save at least as much money as they cost -- for example, through energy efficiency that costs less than the fuel it saves.
- *off-peak energy*: electricity during the low demand period, which is usually cheaper. Utilities often must keep generators turning, and are eager to find users during these periods, and so sell off-peak energy for less.
- *off the grid*: not connected to the powerlines, energy self-sufficient.
- *on-the-grid*: where most of America lives and works, connected to a continent-spanning web of electrical distribution lines.
- *positive discounting*: puts more value on the present than the future.
- *PVs*: (photovoltaics) modules which utilize the photovoltaic or solar electric, i.e. conversion of light into electricity) effect to generate useable amounts of electricity.
- *Real cost*: cost expressed in constant dollars, i.e. corrected for monetary inflation.
- *Real time cost/price*: cost or price of reflecting the instantaneous relationship between supply and demand. It varies unpredictably depending on how scarce or abundant a commodity is at a given moment.
- *reinsurance*: an additional layer of underwriting to help share the risks and ensure the payout of conventional insurance policies, especially for losses due to catastrophic events like storms.
- *renewable energy*: an energy source that renews itself without effort; fossil fuels, once consumed, are gone forever, while solar energy is renewable in that the sun we harvest today has no effect on the sun we harvest tomorrow.
- *renewable portfolio standards*: a “policy” that would shift the electricity generation mix toward renewable electricity. It would require energy suppliers to assemble a “portfolio” of supplies, just as intelligent investors build a portfolio of investments for stability and security. A state or the federal government could require each generator to certify that, for example 2% of its electricity come from non-hydro renewable energy sources, and it could then increase that requirement year by year.

- *Soft Energy Path*: least-cost combination of end-use efficiency, appropriate renewable energy sources, and clean, efficient fossil fuel transitional technologies. Continuation of investments that benefit all customers such as cost-effective, end-use efficiency, far sided research and development, resource diversification and reliability, public health and safety, and other public goods.
- *stranded costs*: Previous utility investments that were originally considered “prudent,” but which will be uncompetitive after restructuring (e.g. nuclear power, which is more expensive than all other major sources, including many renewables), leaving debt without income to pay off those debts.
- *systems benefits charges*: a small surcharge (2.5%-3%) to pay for marginal cost differences between renewables and conventional resources, recognizing the extra environmental and economic benefits of renewables, as well as to support other public purpose programs, such as low income, efficiency, and RD&D.
- *unbundling*: breaking out all the costs of providing electricity services on a real-time basis, and showing separate costs of generation, transmission, and distribution services. For example, most retail electricity today is sold on an average cost basis. Unbundling would allow consumers to see the costs of each kilowatt-hour consumed on an hour-by-hour basis, creating an incentive to conserve during peak periods and to generate and sell renewable energy during those periods.
- *watt-hours*: one watt for one hour. A 15-watt compact fluorescent consumes 15 of these in 60 minutes.

SUGGESTED RESOURCES:

Atlantis Energy, Inc:

Description - Atlantis is a California corporation designing and manufacturing photovoltaic power systems that are integrated into a building's roof or walls. Its new line of Sunslates™ PV roofing tiles is the world's first commercially available roofing system to generate electricity from a renewable resource.

Contact: Steve Coonen, Vice President
233 South Auburn Street, Suite 110, Colfax, CA 95713
TEL: 916.346.9595

Business for Social Responsibility (BSR):

Mission - to provide assistance to companies seeking to implement policies and practices which contribute to long-term, sustained and responsible success of their enterprises and which fairly balance the competing claims of stakeholders, their investors, employees, customers, business partners, communities, and the environment.

Contact: 609 Mission Street, Second Floor, San Francisco, CA 94105-3506
TEL: 415.537.0888; INTERNET: www.bsr.org

California Energy Commission (CEC):

Mission - to assess, advocate, and act through public/private partnerships to improve energy systems that promote a strong economy and a healthy environment.

Contact: Michal Moore, Commissioner
1516 Ninth Street, MS #34, Sacramento, CA 95814-2950
TEL: 800.822.6228; INTERNET: www.energy.ca.gov

California Public Utilities Commission (CPUC):

Mission - to regulate the services and rates of more than 25,000 investor-owned utilities and transportation companies.

Contact: Donna Silverstre, Outreach Officer
107 South Broadway, Room 5109, Los Angeles, CA 90012-4420
TEL: 415.703.2782; INTERNET: www.cpuc.ca.gov

California Public Interest Research Group (CALPIRG):

Mission - to serve as a watchdog for the citizens and environment of California. There are 20 state PIRG's and a National PIRG dedicated to legislative, environmental, and consumer programs, and student empowerment.

Contact: 11965 Venice Boulevard, Suite 408, Los Angeles, CA 90066
TEL: 310.397.3404; INTERNET: www.pirg.org

Center for Energy Efficiency and Renewable Technologies (CEERT):

Description - a non-profit organization which includes the nation's leading environmental groups, energy efficiency providers, and renewable technology firms.

Contact: V. John White, Executive Director
1100 Eleventh Street, Suite 311, Sacramento, CA 95814
TEL: 916.442.7785; INTERNET: www.cleanpower.org

The Center for the Study of Values in Public Life:

Mission - to examine the values that shape public debates, policies, and institutional practices. Its programs pay close attention to the influence of religion and religious institutions in forming public values. The Center promotes a deeper understanding of the commitments that guide scholars and practitioners in different fields of endeavor.

Contact: Brent B. Coffin, Administrative Director

56 Francis Avenue, Cambridge, MA 02138

TEL: 617.496.3586; INTERNET: www.divweb.harvard.edu

The Energy Foundation:

Mission - to assist in the nation's transition to a sustainable energy future by promoting energy efficiency and renewable energy.

Contact: Douglas Ogden, Counsel and Program Officer

Presidio Building 1012, 2nd Floor, Torney Avenue, PO Box 29905, San Francisco, CA 94129-0905

TEL: 415.561.6700; INTERNET: www.ef.org

Enron Renewable Energy Corporation (EREC):

Description - EREC is a world leader in the renewable energy market with a focus on clean, environmentally benign power generation. Activities include the development of solar and wind power plants and the design, manufacture, and sale of solar and wind power generation equipment. Amoco/Enron Solar, a joint venture partnership, is the largest U.S.-owned manufacturer and marketer of solar photovoltaic modules and the second largest in the world. Enron Wind Corp. is a leading American wind energy power plant developer, operator and wind turbine manufacturer.

Contact: Rick Barsky, CEO of Power Development

1400 Smith Street, Suite 419, Houston, TX 77002

TEL: 713.853.6833; INTERNET: www.enron.com

The Environmental Defense Fund (EDF):

Mission - to find solutions to environmental problems ranging from water to wildlife, from toxic chemicals to tropical rainforests. Teams of scientists, economists, attorneys, and others work in areas where people can make a difference in defending the environment.

Contact: Christo Artusio, Research Associate

5655 College Avenue, Suite 304, Oakland, CA 94618

TEL: 800.684.3322; INTERNET: www.edf.org

Independent Power Providers (IPP):

Mission - to develop and build opportunities for market based competitive renewable energy.

Contact: Don Loweberg, President

PO Box 231, North Fork, CA 93643

TEL: 209.841.7001

Institute of Transportation Studies at University of California, Davis:

Mission - to organize and promote multi-disciplinary research of complex transportation problems, especially those related to congestion, environmental, and energy issues. A secondary objective is the dissemination of research findings through conferences and publications and the training of current and future transportation professionals.

Contact: Professor Daniel Sperling

University of California, Davis, Davis, CA 95616

TEL: 916.752.6548; INTERNET: www.engr.ucdavis.edu

Leifer Capital:

Description - Leifer Capital is a full-service municipal consulting firm who advises localities on strategies for a restructured electric power environment, including the cost effectiveness of integrating renewable energy sources into governmental energy portfolios. The firm has evaluated energy efficiency programs, investment vehicles for energy retrofit, pooled financing for utilized expenses, and bond vehicles for energy savings audit recommendations.

Contact: Jeffrey Leifer, CEO

233 Wilshire Boulevard, Suite 525, Santa Monica, CA 90401

TEL: 310.576.6840

The Natural Step:

Mission - to train business, government, educational and community leaders in natural systems thinking and planning so that our collective daily actions support the emergence of a sustainable economy in America and throughout the world.

Contact: Catherine Gray, (Acting) Executive Director

4000 Bridgeway, Suite 102, Sausalito, CA 94965

TEL: 415.332.9394; INTERNET: www.emis.com/tns

Pacific Gas & Electric (PG&E):

Description - PG & E provides electricity service to about 4.4 million customers spanning over 70,000 square miles using a diverse mix of energy sources including natural gas, hydropower, geothermal, and nuclear energy, wind and solar power, and purchased power.

Contact: PO Box 770000, MC-B10A, San Francisco, CA 94177

TEL: 800.743.5000; INTERNET: www.pge.com

The President's Council on Sustainable Development (PCSD):

Vision - of a life-sustaining Earth, committed to the achievement of a dignified, peaceful, and equitable existence. A sustainable U.S. will have a growing economy that provides equitable opportunities for satisfying livelihoods and a safe, healthy, high quality of life for current and future generations. Our nation will protect its environment, its natural resource base, and the functions and viability of natural systems on which all life depends.

Contact: 730 Jackson Place, NW, Washington, DC 20503

TEL: 202.408.5296; INTERNET: www.whitehouse.gov/PCSD

Redefining Progress:

Mission - to stimulate broad public discourse on the type of future Americans desire, and how to best achieve it. The organization was founded on the conviction that the nation's economy and political culture are increasingly at odds with its best values and aspirations, and that bold new thinking is needed to bring them back together.

Contact: *Maureen Kennedy, Executive Director*
One Kearny Street, Fourth Floor, San Francisco, CA 94108
TEL: 415.781.1191

Rocky Mountain Institute (RMI):

Mission - to foster the efficient and sustainable use of resources as a path to global security. RMI focuses on energy, transportation, green development, water and agriculture, economic renewal, corporate sustainability, security, and communications.

Contact: *Amory and L. Hunter Lovins*
1739 Snowmass Creek Road, Snowmass, CO 81654
TEL: 970.927.3851; INTERNET: www.rmi.org

Sacramento Municipal Utility District (SMUD):

Description - SMUD is the fifth largest public utility in the nation and serves a 900 square mile area in and near Sacramento County, California. SMUD plans to have at least half of its energy obtained from energy efficiency and renewable resources by the year 2000. The SMUD Solar Program has three elements designed to increase Sacramento's use of solar energy and accelerate the commercialization of grid-connected PV systems: the Solar Domestic Hot Water Program, the Solar Buildings Program, and the Solar Electric Program.

Contact: *Donald Osborn*
SMUD Solar Program, 6201 South Street, MS #99, Sacramento, CA 9581-1899
TEL: 916.452.3211

Solar Design Associates (SDA):

Description - SDA is an interdisciplinary group of dedicated professionals working to create a sustainably built environment. SDA offers services in environmentally responsive building design, the engineering and integration of renewable energy systems and product and technology development to private, commercial, utility, and research clients worldwide.

Contact: *Steve Strong, President*
Solar Design Associates, Inc., Harvard, MA 01451-0242
TEL: 978.456.6855; INTERNET: www.solar design.com

Solar Electric Light Fund (SELF):

Mission - to promote, develop, and facilitate solar rural electrification and energy SELF-sufficiency in developing countries.

Contact: *Robert Freling, Executive Director*
1734 20th Street, NW, Washington, DC 20009
TEL: 202.234.7265

Southern California Edison (SCE):

Description - SCE is one of five Edison International companies. It is the nation's second largest electric utility, serving more than 11 million people in a 50,000 square-mile area within central, coastal, and Southern California. SCE established the Solar Neighborhood Program with the U.S. DOE, the Electric Power Research Group, and Solec International.

Contact: Aeri Daniels, Project Manager
6090 N. Irwindale Avenue, Irwindale, CA 91702
TEL: 818.302.2255

Union of Concerned Scientists (UCS):

Mission - to advance responsible public policy in areas where science and technology play a critical role. UCS conducts technical studies and public education, and seeks to influence government policy at the local, state, federal, and international levels.

Contact: Two Brattle Square, Cambridge, MA 02238-9105
TEL: 617.547.5552; INTERNET: www.ucsusa.org

U.S. Department of Energy: Center of Excellence for Sustainable Development (U.S. CESD):

Mission - to provide communities with world-class consultation on sustainable development and to help them link to the other public and private programs that can help them develop sustainably.

Contact: William Becker, Director
U.S. Department of Energy, Denver Regional Support Office, 1617 Cole Boulevard,
Golden, CO 80401
TEL: 303.275.4811; INTERNET: www.sustainable.doe.gov

Worldwatch Institute:

Mission - to analyze and focus attention on global problems. Worldwatch is a research organization that draws from a network created through 20 years of global information-gathering. Worldwatch creates many publications including the annual State of the World.

Contact: Christopher Flavin, Senior Vice President/Director of Research
1776 Massachusetts Avenue, NW, Washington, DC 20036-1904
TEL: 202.296.7365; INTERNET: www.worldwatch.org

SUGGESTED READING:

PUBLICATIONS:

Abelson, Philip. Editorial: Improved Fossil Energy Technology in "Science Magazine." April 25, 1997.

Browning, William D. and Joseph J. Romm. Greening the Building and the Bottom Line. Colorado: Rocky Mountain Institute. 1994.

- *Eight documented case studies that show how energy efficient design may be one of the least expensive ways for a business to improve the productivity of its workers and the quality of its product.*

Editor, Ed Ayres. "WorldWatch" is a bi-monthly publication by the WorldWatch Institute at 1776 Massachusetts Avenue, NW, Washington, DC 20036.

INTERNET: www.worldwatch.org

Editor, Maureen McIntyre. "Solar Today" is a bi-monthly publication by the American Solar Energy Society at 2400 Central Avenue, Unit G-1, Boulder, CO 80301-9880

INTERNET: www.ases.org/solar

Lovins, Amory and André Lehmann. Small Is Profitable: The Hidden Economic Benefits of Making Electrical Restructuring the Right Size. Colorado: Rocky Mountain Institute. January 1998.

- *A comprehensive guide on distributed resources which is an alternative approach to delivering electricity with smaller decentralized power sources, such as photovoltaic panels, wind turbines, and fuel cells. (Made possible through a grant from the Pew Charitable Trust.)*

U.S. Department of Energy 197 DOE/GO-10097-357. Solar Electric Buildings: An Overview of Today's Applications. National Technical Information Service.

TEL: 703.487.4650

BOOKS:

Berger, John. Charging Ahead: The Business of Renewable Energy and What It Means for America. New York: Henry Holt and Co. 1997

- *Dr. Berger shows how renewable energy sources, energy efficiency, and electric vehicles, when used together, can sustain a healthy economy and give us back a clean environment. Dr. Berger projects an inspiring yet realistic vision of the energy*

Berman, Daniel M. and John T. O'Connor. Who Owns the Sun? Vermont: Chelsea Green Publishing. 1996.

- *Shows how existing solar technologies combined with local management present logical remedies for our "energy gluttony," narrated against a backdrop of diminishing fossil fuels, environmental degradation, avaricious corporations, and worldwide competition for natural resources.*

Flavin, Christopher, and Nicholas Lenssen. Power Surge: Guide for the Coming Energy Revolution. New York: WW Norton. 1994.

- *Explores the occurring shift in the world energy economy from imported oil and environmentally damaging coal to a new generation of energy efficiency and mass generation of renewable electricity.*

Hawken, Paul. Ecology of Commerce. New York: HarperCollins Publishers, Inc. 1993.

- *Explores the question confronting small and large businesses today: "With every living system on the earth in decline, can we create profitable, expandable companies that do not destroy, directly or indirectly, the world around them?" Hawken explains how business is the only mechanism powerful enough to reverse global environmental and social degradation.*

Hawken, Paul, and Amory and Hunter Lovins. Natural Capitalism: The Proper Use of People and Resources. Boston: Little, Brown. To be released, Autumn 1998.

- *Explores conventional economics, which came into being when people and capital were scarce, and natural resources were regarded as essentially free and infinite, as compared to now when industrialized societies are reaching a point where increased prosperity is not limited by man-made capital but by "natural capital."*

Johansson, Thomas B. Renewable Energy: Sources for Fuels and Electricity. California: Island Press. 1993.

- *Provides a thorough look at the need to find new ways to meet the growing demand for energy. Renewable Energy offers a cutting-edge review of the prospects for renewable energy including the overall performance, cost, market potential, and environmental impact.*

Strong, Steven. The Solar Electric House. Vermont: Chelsea Green Publishing. 1993.

- *Well recommended book on solar electricity for residential applications. Provides an introduction to the history and development of PV and uses a series of case studies to detail how PV can power homes both on and off the utility grid.*

von Weizsäcker, Ernst Ulrich and Amory and L. Hunter Lovins. Factor Four: Doubling Wealth, Halving Resource Use. London: EarthScan. 1997.

- *Factor Four sums up the philosophy of Rocky Mountain Institute: live better, pollute and deplete less, make money, harness markets and enlist business, multiply use of scarce capital, increase security, and be equitable and create more employment. In a nutshell, the message is, "It's time to shift the balance back from labor to resource productivity. (Available through RMI Publications Department)*

Acknowledgments

The U.S. Solar and Renewable Energy Policy Symposium was sponsored and organized by University of California, Santa Barbara and Global Possibilities.

The event was made possible by the generous support of Casey Coates Danson of Global Possibilities and The Energy Foundation.

A very special thanks goes to Robert Wilkinson of UC, Santa Barbara for his innovative thinking, endless and tireless energy, and dedication to making this event such a success, and a special thanks goes to Pam Wilkinson for her hospitality and unconditional support. Further appreciation goes to UC, Santa Barbara and Walter Kohn who provided a comfortable and beautiful meeting space, and to Jeff Leifer of Leifer Capital for his support, and Barry Schuyler for the wind powered recreation. Additional thanks to Noah's Bagels and Bistro Med in Santa Barbara.

Global Possibilities wishes to express deep appreciation toward all the vision, expertise, and commitment represented by each of the participants who have helped launch the first steps of our young and emerging nonprofit organization: Donald Aitken, Christo Artusio, Ed Begley, Jr., William S. Becker, Daniel Berman, Steve Coonen, Steve DeCanio, Jim Dehlsen, Christopher Flavin, Robert Freling, Charles Kolstad, Jeffrey Leifer, Amory B. Lovins, L. Hunter Lovins, Don Loweberg, Mel Manalis, Ed Maschke, Michal Moore, Douglas Ogden, Claude Poncelet, Barry Schuyler, Steven J. Strong, Kathy Treleven, V. John White, and Robert Wilkinson.

This summary report was produced by all the participants, and the committed audio and video recorders Eric Zimmerman and Michael Catlin. It was compiled, refined, and edited by Kristin Coates, Casey Coates Danson, and Glenn Waguespack of Global Possibilities.