Testimony of James Resor,
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Before the United States House of Representatives
Committee on Natural Resources Subcommittee on Insular Affairs and Subcommittee on Energy and Mineral Resources
April 12, 2007

Introduction:

Thank you, Mr. Chairman and Members of the Committees, for providing me the opportunity to testify today.

My name is James Resor. I am the Chief Financial Officer of groSolar, Inc. groSolar (www.grosolar.com) is a national distributor, integrator and installer of solar photovoltaic systems for residences and commercial enterprises. We are active in more than forty states and Canada with offices and distribution centers in several northeastern states, New Jersey, Colorado, California, Oregon and Canada.

In addition to our diverse residential solar experience, groSolar has designed and installed solar systems for a wide range of commercial and government enterprises and other property owners. These installations include: food distribution centers, agricultural operations, schools, municipal buildings, general office buildings, multi-unit residential complexes, sports stadiums and resort properties. These solar installations are tied to the local electric utility ("grid-tied"). Customers retain access to their electric utility while generating electricity from solar power.

Solar energy systems (photovoltaic for electricity or solar thermal for water heating) can be used in most places throughout the United States. Photovoltaic (PV) and solar water heating systems are distributed generation (DG) technologies. Like other DG technologies, they provide energy at the point of consumption rather than at a central power plant hundreds of miles away. As such, DG does not rely on vulnerable regional transmission lines and local distribution networks. By producing energy at the source of consumption, solar power alleviates stress and vulnerability on the grid. It also ensures power generation should transmission facilities or generating stations fail due to terrorism, accidents or natural disaster. Solar power is a very flexible solution that can be added in targeted or widespread doses for residential and commercial purposes to meet the needs of consumers and utility grid reliability.[1]

Where Solar Energy Makes Sense:

[1] See Appendix 1 for overview of PV, solar thermal and other solar technologies

The relative attractiveness of solar installations depends upon three sets of variables: (i) geographic/economic factors, (ii) site characteristics, (iii) and program objectives:

1. Geographic/Economic Factors:

- Utility prices for conventional electricity vary greatly among different parts of the country. High cost areas like the Northeast, much of California, Hawaii and Insular Areas such as the U.S. Virgin Islands make solar systems look relatively more attractive than in low cost areas such as parts of the Southeast or certain Western states. When electricity prices are approaching $0.20 per kwh or even higher (versus the U.S. mainland average of $0.13 per kwh), this makes solar energy that much more attractive. Thus, in places like the U.S. Virgin Islands or Hawaii, prices greater than $0.30 per kwh offering a compelling opportunity to install solar energy systems.

- Favorable local regulations such as the existence of "net metering", which allows customers to sell excess power back to the grid at the same price as they purchase power, are critical.

- Local/utility financial incentives provided by the state or local government or utility company that can augment federal incentives. An example of this can be where the local utility is willing to provide incentives to homeowners or businesses to install solar in order to address peak demand or grid congestion issues. This can help the utility mitigate risks of brownouts and/or avoid expensive grid or generation capacity enhancements. For example, groSolar is working with several utilities to provide "distributed generation" near the demand points to work around grid congestion points and thus avoid expensive grid upgrades.

- Amount of sunlight. While Arizona is obviously better than Massachusetts in terms of sunlight, other variables such as relative utility prices and local regulations are more critical and usually outweigh the significance of the amount of sunlight. Consider the fact that Germany and Japan have been the leaders in solar capacity with far less solar resources than the U.S. Acceptance of solar energy in southern California has more to do with high electric rates and supportive local incentives than plentiful sunlight.

2. Site Characteristics:

- Various site-specific characteristics affect the productivity and/or installation costs of solar systems. It is preferable to have:
  - Unobstructed southerly site exposure
  - Flat roof or low-angle slope (or nearby fields or parking lots for ground-mounted or canopy arrays)

- Less than 60 feet above ground for roof mounted systems (preferably 1-2 stories)

- Structurally sound roof to bear weight of solar array without significant obstruction from dormers, mechanical equipment, vents or shading from sunlight

3. Program Objectives (some of these apply more to commercial opportunities):

- Property owner/manager objectives
  - Lock in long-term, predictable energy costs to mitigate risks of electric rate increases, particularly for those areas that are highly dependent upon petroleum-based sources for electric generation.
  - Reduce carbon emissions
  - Use solar energy as part of broader energy conservation measures (e.g. with efficient lighting, recycling, etc.) to reduce overall energy costs
  - Public relations value to residents, employees, customers and other constituents
- Sufficient scale of project to provide economies of scale for design, permitting, financing, installation of multi-residential sites or office buildings. A portfolio of smaller projects or residential installations, which share a common owner/manager and other characteristics, can also provide attractive economies of scale and reduce the all-in cost of solar installations.
- Long-term financing potential
  - Good credit quality of owner/user of power (or use of 3rd-party credit enhancements/guarantees) to facilitate long-term financing
  - Ability of owner or third-party to use commercial investment tax credits which are currently 30% in year one

Current Legislation:

I would now like to direct my testimony to current discussions within Congress. The timing of this joint hearing is excellent. Earlier this month, Senators Cantwell and Ensign proposed the Energy Tax Stimulus Act of 2008 (S. 2821). It contains key items that are necessary for continued rapid growth of solar energy in the U.S., including Insular Areas such as the U.S. Virgin Islands. The proposed legislation draws on strong bipartisan support for solar. For example, two important provisions are:

1. the extension of the 30% Investment Tax Credit (ITC) for commercial solar investments for eight years (and allowing electric utilities to claim the ITC)

2. the extension of the 30% personal tax credit for one year for residential solar investments while also repealing the current $2,000 cap

Further information on the components of this important legislation is included in Appendix 2. The short and long-term benefits of enacting this legislation would be significant. The benefits include:

- **Increased energy security:** Solar energy is a domestic and abundant energy source in the U.S. The U.S. has the best solar resources of any developed country in the world. Proportionally, U.S. solar energy resources exceed those of fossil, nuclear or other renewable energy resources. Despite this tremendous advantage, the U.S. has failed to capture and harness this free and readily available energy. In 2006, solar energy produced just 1/30th of one percent of all electricity in the U.S.; Germany in contrast, with the solar resources no better than those of Alaska, installed seven times more solar energy property than the entire U.S.[2] Solar technologies help stabilize the nation's electricity grid, provide clean, reliable power, and reduce the impact of natural disasters and terrorist acts. By generating electricity at the point of consumption, the effects of natural disaster or terrorist attacks can be mitigated. Producing these home-grown technologies in the U.S. will reduce our dependence on foreign sources of energy, while simultaneously lowering the cost of energy to consumers.

Figure 2: Germany Insolation

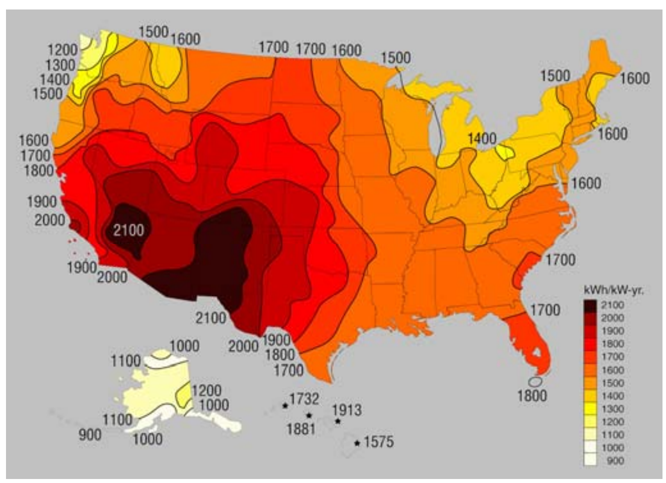
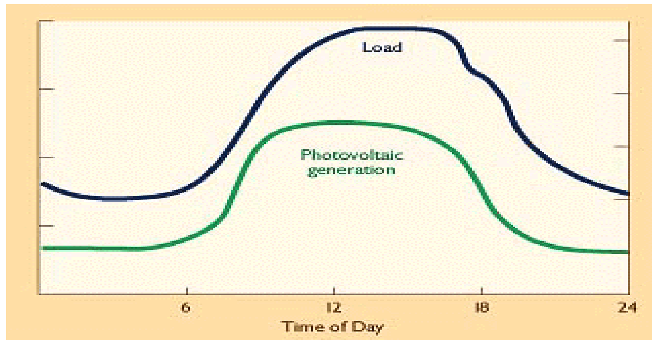


Figure 3: U.S. Insolation

[2] EIA, Net Generation by Energy Source by Type of Producer, October 2006.

- **Reduction in the use of high cost natural gas (and other petroleum-based fuels):** In most parts of the U.S., peak electricity demand occurs when solar electricity is near optimal efficiency (9 AM – 6 PM). This demand load is almost exclusively served by central station gas generation (or other petroleum-based fuels) that can be easily cycled on and off and is often highly inefficient. Given the high price of natural gas to key industrial sectors and consumers, the U.S. can no longer afford to neglect its abundant solar resources. Analysis conducted by the Solar Energy Industries Association (SEIA) concludes that an eight-year extension and expansion of investment tax credits for solar energy will displace over 5.5 trillion cubic feet (Tcf) of natural gas, providing an economic value to consumers in excess of $50 billion.[3] This is enough energy to displace the need for all new LNG terminals by 2012.



Utility load and PV output versus time of day.

- **Hedge against rising energy prices:** In the last five years, consumers have seen electricity prices escalate between 20 and 78 percent. At the same time, we have seen the price of natural gas triple and the price of gasoline routinely exceed $3.00 per gallon. Each year the cost of energy is taking a larger percentage of a family's income than at any other time in U.S. history. This energy inflation vulnerability especially impacts the poor and elderly on fixed incomes. Solar can help address this vulnerability because it requires no fuel to operate. Although a solar system is more expensive up front in many cases, there are no additional costs for operating a system once installed. Furthermore, solar panels are guaranteed for 20-25 years, allowing consumers to "lock in" their electricity prices for decades.

- **Job creation:** Solar systems require high-tech manufacturing facilities and produce well paying, high-quality jobs. Extending the tax credit will create an estimated 55,000 new jobs in the solar industry and over $45 billion in economic investment. groSolar has doubled its workforce in the last 12 months, including some hires who had been recently laid off from construction related employment due to the downturn in the U.S. housing market.

- **Clean energy and environmental benefits:** Solar energy is the cleanest method of energy generation, in terms of avoided air, waste and noise pollution, energy payback, water conservation, radiation, harm to wildlife, or environmental risk in the event of an accident. Solar energy produces no greenhouse gases, no acid precipitation or toxic emissions, and no other air pollution of any kind. Over the 40-50 year life of a solar electric system, every kilowatt (kW) of solar electric power reduces 217,000

[3] Solar Energy Industries Association Natural Gas Displacement Model

pounds of carbon dioxide, 1500 pounds of sulfur dioxide, and 830 pounds of nitrogen oxides emissions as compared to electricity produced by conventional generation.[4] Photovoltaic solar energy generates electricity without using any water. In contrast, fossil fuel and nuclear based electricity generation use substantial amounts of water to run steam turbines. Across the U.S., approximately 40% of fresh water withdrawals are used for electric generation.[5] If water-starved communities like Phoenix and Las Vegas are to continue growing, we must place greater emphasis on water-free electricity generating technologies.

[4] NREL report, "Distributed Energy Resources for the California Local Government Commission," October 2000.
[5] Sandia National Laboratories, Energy-Water Nexus, http://www.sandia.gov/news-center/news-releases/2006/environ-waste-mgmt/mapwest.html

APPENDIX 1

OVERVIEW OF SOLAR ENERGY TECHNOLOGIES

Photovoltaics (PV)

Technology

Photovoltaic (PV) devices generate electricity directly from sunlight via an electric process that occurs naturally in certain types of material. Groups of PV cells are configured into modules and arrays, which can be used to power any number of electrical loads.

Crystalline silicon - the same material commonly used by the semiconductor industry - is the material used in approximately 90% of all PV modules today. PV modules generate direct current (DC) electricity. For residential use, the current is then fed through an inverter to produce alternating current (AC) electricity that can power the home's appliances.

The majority of PV systems today are installed on homes and businesses that remain connected to the electric grid. Consumers use their grid-connected PV system to supply some of the power they need and use utility-generated power when their power usage exceeds the PV system output (e.g., at night). In 41 U.S. states, when the owner of a grid-connected PV system uses less power than their PV system creates, they can sell the electricity back to their local utility, watch their meter spin backwards, and receive a credit on their electric bill - a process called **net metering.** The electric grid thus serves as a "storage device" for PV-generated power. Net metering is a critical requirement to facilitate adoption of PV systems.

Markets

The global PV market has averaged 38% annual growth over the last five years. Yet PV still accounts for a small percentage of electricity generation worldwide and less than 1/30th of 1% in the U.S. Furthermore, the U.S. lags behind Germany and Japan in installations as well as in manufacturing. Germany and Japan have surged to the lead with coherent, long-term national incentive policies, despite dramatically inferior amounts of sunshine.

The U.S. possesses the best solar resources in the world, and yet Germany installs **seven-times as much PV as the U.S**. Germany and Japan have taken the lead in solar manufacturing and installations because of long-term national incentive policies designed to make solar power mainstream. Japan instituted a carefully designed rebate program that lasted over ten years, while Germany incentivizes solar installations by paying 3–4 times retail electric rates for the electricity generated from PV systems for 20 years. The surging player in the industry, China, has gone from having no PV industry to manufacturing twice the level of the U.S. in just three years. While California is the dominant U.S. market for PV, with 73% of the grid-tied installations in 2006, there is substantial activity in other states.

Solar Thermal Systems

Technology

Solar thermal systems provide environmentally friendly heat for household water and space heating. The systems collect the sun's energy to heat either air or a fluid. The air or fluid then transfers solar heat to your home or water. In many climates, a solar heating system can provide a very high percentage (50 to 75%) of domestic hot water energy. In many northern European countries, combined hot water and space heating systems are used to provide 15 to 25% of home heating energy.

Active solar water heating systems can be either "open loop," in which the water to be heated flows directly through the rooftop collector, or "closed loop," in which the collector is filled with an antifreeze solution that passes through a heat exchanger mounted in or around your normal water heater. During the day, in good weather, your water can be heated entirely by the sun. In any weather, the heating system can back up your existing heater, reducing overall energy costs.

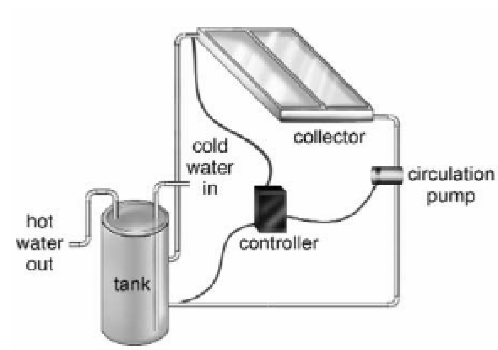


Diagram of an active solar thermal system.

Markets


An installer mounts a solar water heater flush to the roof.

In the absence of coherent national policies, from 1997 until 2005, the U.S. solar water heating and solar space heating market showed little growth, averaging about 6,000 installations per year. In the past couple years, numerous states have created or expanded incentives to complement the new federal tax credits. Accordingly, the market is has increased quite a bit. Solar water heating can be done at same time as PV.

Concentrating Solar Power

Technology

Concentrating solar power (CSP) plants are utility-scale generators that produce electricity by using mirrors or lenses to efficiently concentrate the sun's energy. Two principal CSP technologies are parabolic troughs and dish-Stirling engine systems.

Using curved mirrors, **parabolic trough** systems concentrate sunlight to drive conventional steam turbines. The mirrors focus the sun's energy onto a receiver pipe or heat collection element. From there, a high temperature heat transfer fluid picks up the thermal energy and uses the heat to make steam. The steam drives a conventional steam-Rankine power cycle to generate electricity. A typical collector field contains many parallel rows of troughs connected in series.

A parabolic trough plant in California's Mojave Desert.

Thin Film Solar

Technology

There are four basic categories of thin film PV based on the materials used to convert light into electricity. They are: i) Amorphous Silicon (• α-Si), ii) Cadmium Telluride (CdTe), iii) Copper Indium (Gallium) di-Selenide (CIS/CIGS) and iv) Emerging (Dye-sensitized, Organic or Nano-materials)

Not only can different materials be used to create the PV effect, but they can also be deposited on different substrates. Currently, most production technologies use glass as the substrate, as in the case of all CdTe technologies, and many emerging α-Si technologies. But some α-Si solutions use a flexible metal foil as the substrate, and many emerging and CIGS technologies can be deposited on glass or metal foil as well as lower temperature substrates like plastic.

Unlike today's traditional solar photovoltaic (crystalline PV) technology, thin film PV uses very little or no silicon and other material to build a solid state electricity generation device. Thus, a whole new range of applications otherwise not possible using traditional solar cells are enabled because thin film materials can be applied to a multitude of surfaces such as glass, plastic and flexible metal foils. Thin film PV can be manufactured using various deposition and packaging methods that offer flexibility in scaling production and addressing applications. Currently, commercial applications of thin film PV are limited due to lower efficiencies and used predominantly for large utility-scale PV projects where space is not a constraint.

APPENDIX 2

The Clean Energy Tax Stimulus Act of 2008

On April 3, 2008 Senators Cantwell and Ensign announced the Clean Energy Tax Stimulus Act of 2008 (S. 2821). It contains key items that are necessary for continued rapid growth of solar energy in the U.S. Here is a summary of key sections of the proposed legislation.

Purpose: To provide for the limited continuation of clean energy production incentives and incentives to improve energy efficiency in order to prevent a downturn in these sectors that would result from a lapse in the tax law.

<u>Title I – Extension of Clean Energy Production Incentives</u>

Section 101. Extension and modification of the renewable energy production tax credit (IRC Section 45). Under current law, an income tax credit is allowed for the production of electricity using renewable energy resources, like wind, biomass, geothermal, small irrigation power, landfill gas, trash combustion, and hydropower facilities. A taxpayer may generally claim a credit for 10 years, beginning on the date the qualified facility is placed in service. In order to qualify, however, facilities must be placed in service by December 31, 2008. *The bill extends the placed in service date for one year (through December 31, 2009). It also redefines small irrigation power to include marine and hydrokinetic energy, and enables the credit to help reduce the cost of renewable electricity that is ultimately sold to utility customers when the utility itself is also a part owner of the renewable facility.*

Section 102. Extension and modification of the solar energy and fuel cell investment tax credit ("ITC") (IRC Section 48). Under current law, taxpayers can claim a 30 percent business energy credit for purchases of qualified solar energy property and qualified fuel cell power plants. In addition, a 10 percent credit for purchase of qualifying stationary microturbine power plants is available. The credit for qualified fuel cell power plant property is capped at $500 per 0.5 kilowatt of capacity. Credits apply to periods after December 31, 2005 and before January 1, 2008. *The bill enables taxpayers to claim the 30 percent business credit for the purchase of fuel cell power plants and solar energy property and the 10 percent credit for stationary microturbines, through December 31, 2016. In addition, the bill repeals the $500 per .5 kilowatt of capacity cap for qualified fuel cell power plant property, and allows electric utilities to claim the ITC.*

Section 103. Extension and modification of the residential energy-efficient property credit (IRC Section 25D). Under current law, taxpayers can claim a personal tax credit for the purchase of property that uses solar energy to generate electricity for use in a dwelling unit and qualified solar water heating property that is used exclusively for purposes other than heating swimming pools and hot tubs. The credit is equal to 30 percent of qualifying expenditures, with a maximum $2,000 credit for each of these systems of property. Section 25D also provides a 30 percent credit for the purchase of qualified fuel cell power plants. The credit for any fuel cell may not exceed $500 for each 0.5 kilowatt of capacity. The credit applies to property placed in service prior to January 1, 2009. *The bill extends the credit for residential solar property for one year (through December 31, 2009) and repeals the $2,000 credit cap for qualified solar electric property. The bill also allows the tax credit to offset Alternative Minimum Tax ("AMT") liability.*

Section 104. Clean Renewable Energy Bonds ("CREBs") (IRC Section 54). Under current law, public power and consumer-owned utilities that cannot benefit from tax credits can issue Clean Renewable Energy Bonds (CREBs) to help them reduce the cost of renewable energy investments. Under current law, there is a national CREB limitation of $1.2 billion in bonding authority and CREBs must be issued before December 31, 2008. *This bill authorizes an additional $400 million of CREBs that may be issued and extends the authority to issue such bonds through December 31, 2009. In addition, the bill allocates 1/3 of the additional bonds for qualifying projects of State/local/tribal governments; 1/3 for qualifying projects of public power providers; and 1/3 for qualifying projects of electric cooperatives.*

Section 105. Extension of the special rule to implement FERC restructuring policy (IRC section 451(i)). *The bill extends through December 31, 2009, the present-law deferral provision that enables qualified electric utilities to recognize gain from certain transmission transactions over an 8-year period.*

Title II – Extension of Incentives to Improve Energy Efficiency

Section 201. Extension and modification of the credit for energy-efficiency improvements to existing homes (IRC section 25C). Current law provides a 10 percent investment tax credit for purchases of advanced main air circulating fans, natural gas, propane, or oil furnaces or hot water boilers, windows and other qualified energy-efficient property. The credit applies to property placed in service prior to January 1, 2008. *The bill extends the credit for one year (through December 31, 2009), and specifies that certain pellet stoves are included as qualified energy-efficient building property.*

Section 202. Extension of the tax credit for energy-efficient new homes (IRC section 45L). Current law provides a tax credit to an eligible contractor equal to the aggregate adjusted bases of all energy-efficiency property installed in a qualified new energy-efficient home during construction. *The bill extends the energy-efficient new homes credit for two years (through December 31, 2010), and permits the eligible contractor to claim the credit on a home built for personal use as a residence.*

Section 203. Extension of the energy-efficient commercial buildings deduction (IRC section 179D). Current law allows taxpayers to deduct the cost of installing energy-efficient improvements in a commercial building. The deduction equals the cost of energy-efficient property installed during construction, with a maximum deduction of

$1.80 per square foot of the building. In addition, a partial deduction of 60 cents per square foot applies to certain subsystems. The deduction applies to property placed in service prior to January 1, 2009. *The bill extends the deduction to property placed in service through December 31, 2009, increases the maximum deduction to $2.25 per square foot, and allows a partial deduction of 75 cents per square foot for building subsystems.*

Section 204. Modification and extension of the energy-efficient appliance credit (IRC section 45M). Current law provides a credit for the eligible production of certain energy-efficient dishwashers, clothes washers, and refrigerators. The credit for dishwashers applies to dishwashers produced in 2006 and 2007 that meet the Energy Star standards for 2007. *The bill extends the credit to appliances produced in 2008, 2009, and 2010 and updates the qualifying efficiency standards in accordance with the Energy Independence and Security Act of 2007.*