International Solar Energy Technology Programs Strategic Planning Meeting Report
July, 2003

Background

The U.S. Department of Energy Solar Energy Technologies Program sponsors a substantial amount of international activity. This work is closely related to, and coordinated with, international activities by other organizations both within DOE and outside. These include DOE/OWIP and DOE/IP, USAID, the World Bank and its related institutions, the International Energy Agency and individual governments. Many of these activities have components which have been operating successfully for several years, and have a proven record of accomplishments. Recent changes in the management and organization of the DOE solar program make this an opportune time to prepare a strategic plan that considers all of DOE's international solar activities and suggests ways to enhance their value.

On December 19, 2002 a meeting was held in Linthicum, Maryland to discuss ways to leverage international collaboration in ways that will benefit the solar program, and to initiate a strategic plan to achieve that goal. Representatives from AID, the World Bank, DOE's Solar Energy Technologies Program, DOE/EERE's International Program, and the DOE National Laboratories attended the meeting, as well as representatives from other international stakeholders (Winrock International, ISP, NMSU/SWTDI, FSEC). The workshop reviewed current international activities and provided an update on the current goals and priorities of the organizations involved in international solar development. Alliances among the organizations were reaffirmed and new opportunities for collaboration were discussed. Improvements in how international activities related to solar energy can be monitored and coordinated were suggested, and a working group formed to develop coordination methodologies. The results of that meeting are summarized in this report, and recommendations are provided as to the next steps in developing an integrated strategy for solar international activities and proceeding with its implementation. The meeting agenda and participants and raw notes from the meeting are attached to this document as an appendix, as well as presentations on current activities.

Recommendations:

Several recommendations emerged from the discussions at the meeting. These include:

1) Immediately form a working group to
   a) Complete and distribute the meeting report
   b) Develop a complete "database" of on-going international RE programs
   c) Outline next steps for developing an integrated, coordinated, systems driven DOE/EERE approach to international programs
2) Develop, in conjunction with other DOE/EERE partners as well as other participating federal agencies, a comprehensive strategy and multi-year plan for international programs.

Meeting Objectives:

- Review the DOE missions for international program rationale and appropriateness
- Review the interaction and synergies among domestic and international programs
- Review current STP, other DOE, and related (USAID, etc.) renewable energy international programs
- Discuss the constituency (and benefit to them) for the programs
- Begin developing an SETP strategy for FY03 – 08 international programs
- Provide guidance for the Laboratory AOP's to support this strategy

Mission

It was reaffirmed during the meeting that International Activities are an integral part of DOE's, DOE/EERE's and DOE/SETP's mission.

The Mission of the Office of Energy Efficiency and Renewable Energy (EERE) is to strengthen America's energy security, environmental quality, and economic vitality through public-private partnerships that:

- promote energy efficiency and productivity;
- bring clean, reliable, and affordable energy technologies to the marketplace; and
- make a difference in the everyday lives of Americans by enhancing their energy choices and quality of life.

DOE international solar activities help accomplish this mission by leveraging international markets and international research to advance solar energy technology applications and deployment. Over two-thirds of all solar electric products are exported. U.S. equipment manufacturers rely on these markets abroad to sustain their business operations while domestic markets for these devices develop. One-third of the world's population lacks access to electricity. This is a promising near-term market for solar companies that are still struggling to reach levels of mass production, performance and cost that will make their products practical for large-scale domestic energy production.

Lessons learned from projects installed in developing countries and from research collaboration with other developed countries advances solar technology and speeds progress toward the day that solar energy will make a significant difference in U.S. energy use. Because international applications and markets are such an important factor in the solar industry it is essential to be engaged in and understand the impact international development has on solar energy.

Program Goals and Objectives

The goals and objectives of DOE's international solar activities address broader solar program priorities:

- To maintain the U.S. solar industry's worldwide technological leadership;
- Achieve economic competitiveness with conventional technologies;
- Maintain a sustained PV market with accompanying production growth;

- Make the solar industry profitable and attractive to investors.

These are consistent with solar industry technology roadmaps, which emphasize the importance of fostering domestic and international markets for solar energy. Industry also supports national and international standards for solar products and components that help protect consumers (and increase consumer confidence), encourage solar development, and reduce market fragmentation by creating consistent standards and regulations across political and geographic boundaries.

The objectives of DOE's international solar activities, the steps being taken toward accomplishing the solar program's goals, include:

- Contributing to cost reduction of solar energy applications overseas by improving solar technology based on field experience, and investigating approaches to improve financing, distribution and maintenance.
- Increasing the awareness of solar energy's potential and value by gathering data, documenting the results of key applications, and disseminating the information.
- Fostering market development by removing technical and non-technical barriers. For example by seeking to harmonize safety, quality and performance standards within countries and across borders, researching reliability and performance, and investigating cross-technology solutions to common energy applications like water pumping and purification, telecommunications and distance education, and village power.
- Enhancing technical cooperation with other countries to share important information and data that advances research and development and leads to consistent, acceptable international standards.
- Disseminating information on solar technology to researchers, governments, consumers and other organizations to enhance opportunities for partnerships and increase interest in solar energy technology.
- Supporting national security missions with technical assistance and advice on the productive use of solar in rebuilding national infrastructure in nations ravaged by war, and by supporting U.S. military operations.

Program Strategy

DOE's international solar energy activities employ a combination of strategies to accomplish international goals. DOE's international activities in solar depend on the technical credibility and qualifications of the organizations and staff that implement it. Being a reliable source of technical information and analysis is essential to DOE's international activities in solar energy.

It is recognized that the resources (funding) available for international activities are a small part of the overall program. Based on this, it is important to collaborate with other DOE offices, US government agencies (USAID, USDA, EPA, etc.) and other entities (multinational development banks, United Nations, other national governments, etc.) to aggregate projects and resources and to leverage funding. This is currently a common attribute of most of the international activities conducted by the meeting participants.

DOE activities are designed to assist the development of the domestic U.S. solar industry, and to leverage their expertise and resources when appropriate. Solar companies are increasingly multi-

national with facilities and resources based in many countries. Even so, there is still a strong core of U.S. companies and facilities whose technologies are the focus of DOE's international activities in solar energy.

Student programs, international exchanges, conferences and other activities that are not specifically identified as part of DOE's solar international activities are nevertheless a part of the strategy for achieving international objectives. Work with Native Americans, and on remote applications also have direct relevance to international activities. Exchanges of students and researchers also promote international cooperation and build international experience throughout the solar program. This "hidden" international activity is an important resource to be leveraged.

DOE's international activities are designed to enhance the transition to sustainable development through solar energy. Sustainability underlies the national security, environmental and economic goals of solar energy and is critical to creating lasting, widespread demand for solar energy. DOE's international solar activities emphasize the value of solar applications and their positive impacts on users.

It is recognized that the United States must participate in international organizations (International Energy Agency, Solar Paces, etc.) that establish international conventions and standards in order to represent U.S. interests in technical standards by providingtechnically credible information and analysis.

Because DOE's international solar activities are so diverse, decentralized, and involve such a range of partners and regions, the solar program will rely heavily on regular exchanges of information and reporting of international activities. Effective management is difficult in this environment. A process for regular communication, coordination and reporting that does not require a large investment of time by the people performing the work is necessary to ensure that international activities receive the attention and emphasis they deserve.

SWOT – Strengths, Weaknesses, Opportunities, Threats

One of the major topics of the meeting was a discussion of the strengths, weaknesses, opportunities and threats facing the program. These were the raw materials that will be used in developing the broad strategy for international activities, and will also be used to develop plans for activities, resources and milestones for international activity. The discussions are summarized here as background for the strategic plan – items that need to be considered as DOE moves forward.

Strengths of DOE International Solar Activities

DOE's international activities in solar energy benefit from the positive aspects of solar energy. Solar energy is clean – it produces few conventional pollutants and no greenhouse gases. The solar resource is available globally, and it is a secure and reliable energy option that contributes to energy independence. Finally, solar energy can be the energy source for long-term sustainable development. These are the attributes that sell solar energy internationally.

Solar technology and its applications in developing countries now have a proven track record. Especially in off-grid installations, the technology is mature and reliable, and U.S. technologies

in particular have a good reputation. For many applications in developing countries there are no competing options or solar is the lowest cost/best solution. Solar companies have also become more substantial. They are starting to earn profits and operate more extensive networks for marketing, sales and service. This adds to the credibility of their products, and to their ability to work effectively with DOE to explore international solar applications.

As solar technology improves, it creates new opportunities that can build on the current foundation of proven applications. Concentrating solar power with thermal storage creates the possibility of cost-effective central station generation and dispatchable power. Thin-film PV creates new opportunities for PV integration into building materials and into end-use equipment. The breadth and depth of technologies and applications keeps expanding, creating new opportunities.

The DOE National Laboratories and the DOE solar program are recognized for their expertise and the objectivity of their work. While the goal of DOE international solar activities is to help the domestic solar industry, DOE expertise and assistance is not tied to individual companies or their products. DOE offers a desirable mix of people and facilities that are attractive to partners because of their reputation. DOE programs and the staff at DOE labs also constitute a store of expertise and knowledge about solar technology and program experience that is a source of information and knowledge that partners need. The staff involved in international activities has years of experience, and have developed the cultural sensitivity and knowledge of specific countries and regions needed to be effective.

International activities are highly leveraged by other organizations and countries, with a track record of collaboration and trust that is a sound basis for continuing work. There is a network of bilateral and multilateral mechanisms available for collaboration, including long-term commitments that allow for a sustained set of activities over time. Within the DOE's programs there is also an evolving coordination among programs, particularly among the renewable energy technologies. Similar expansion in coordination is taking place with AID and World Bank.

DOE's international activities have a track record of accomplishment. There have been positive outcomes in information sharing, research and development, and in standards development that encourages continued cooperation. There is also an international community within the U.S. and beyond that provides a pool of expertise and interest that generates new ideas and can apply the results of previous work. Strong intergovernmental relationships have evolved and contacts with other countries are occurring at higher levels with greater influence than in the past.

Weaknesses

Compared to the United States' competition, international solar activities within DOE and among its key agency partners are poorly funded. In addition to the level of funding, there is also substantial uncertainty in funding because international work on solar depends on funds from the larger program, so they compete internally with many other activities. Funds also tend to be committed to particular activities as the result of bilateral commitments or long-term activities, which limits flexibility in responding to opportunities or adjusting priorities over time.

Shifting levels of commitment and interest in international activities is another weakness of the program. Policy changes regarding issues like climate change, shifts in regional interests, and differing philosophies on government's role in technology development have all confused the direction and vision for international activities. For work that is so dependent on partnerships with other agencies and countries, changes in emphasis and direction complicate management. Compared to other developed countries, U.S. support for solar energy, particularly market support, appears weak. This undermines U.S. credibility because we are not leading by example.

Another consequence of international solar activities' tendency to grow in new directions in response to shifting policy and management interests is fragmentation. There has been limited effort to create an overall, integrated set of international activities. Much of the work has become highly identified with particular institutions and individuals, which complicates cooperation and information sharing. It is difficult to quickly identify commonalities, gaps, and overlaps in activities that could improve their management. Fragmentation is also reflected in the lack of a single clearinghouse for information and problems with cross-technology coordination and collaboration.

There is a tendency for activities to focus on solar technologies, rather than on applications that use solar technologies. Research focuses heavily on engineering, instead of social science and other disciplines that could improve understanding of markets and cultures to improve the integration of solar energy into overall development. Opportunities to involve other efficiency and generating technologies that could complement solar energy are also a casualty of a strong solar technology focus.

While solar technologies have made major advances over the last two decades, they are still unfamiliar to many people. Solar systems are also more complex than their conventional competition because there are a large number of configurations and deployment options -- a consequence of the modular nature of many solar technologies. There are very few certified, reliable, plug-and-play devices adapted to overseas applications. The result is a technology that requires training and extensive information to win new markets. Some solar technologies are also either just emerging from the laboratory (thin-film PV) or have limited deployment experience – like solar thermal troughs and power towers. In combination with high upfront capital costs, this immaturity increases the risk of investing in these technologies in international markets, especially in developing countries where investment funds are scarce.

The nature of energy markets in developing countries is inherently difficult. While there is great need, financing, infrastructure, human capital and know-how are lacking. International solar energy activities occur amidst a backdrop of enormous problems that go far beyond adequate energy in countries where people are often struggling with even more basic issues like adequate nutrition, clean water and finding shelter.

U.S. industry's interest, and ability, to participate in solar international activities varies enormously. Government involvement in solar energy development is not welcomed by industry players who may already have a foothold in a market and are fearful that government activities will benefit their competitors. Diminishing U.S. ownership of the solar industry is leading to more situations where companies have interests in the U.S., Germany, Japan and other countries

that are competing for their involvement in international development activities. For smaller companies, expanding into new overseas markets in partnership with DOE international activities may simply be beyond their means.

The positive results of international activities are not disseminated effectively. Outside of the people doing the work and the partners involved, there is very limited DOE management awareness of international activities, and limited public awareness as well. The accomplishments of international activities need to be recognized in order to attract the support these activities need.

Flat or declining budgets for solar technology research and growing investments by U.S. competitors are beginning to erode U.S. R&D leadership. The U.S. reputation as the technological leader in solar technology is threatened, which also undermines the attractiveness of working with the U.S. on international activities.

Although international activities are designed to advance DOE goals and objectives, their connection to markets, future profitability and learning curves generated by international activities are underappreciated.

Finally, international solar activities inherently involve a more complicated bureaucracy because of issues of foreign travel, cooperation with foreign governments, and the overhead involved in arranging and managing multiple partnerships.

Opportunities

Solar energy's potential in terms of resources and applications have barely been explored – so there is no lack of opportunities to find new applications. Growing concern with climate change, conventional pollution, energy security and sustainable development all encourage solar energy development. There are still 2 billion people in the world without access to electricity. Over the long-term, the hydrogen economy will need a clean power source to produce the hydrogen – a good role for solar energy.

The growing realization that neglecting rural development contributes to the problems of migration to cities and immigration between countries is a positive development for solar energy, because it is a problem solar energy can address. The lack of infrastructure in developing countries and the enormous capital costs involved in creating an entire centralized energy system also argues for a wireless, solar solution. Growing privatization and rationalization of energy markets is also a consequence of recognizing the enormous infrastructure challenge involved in bringing electricity to the developing world. Market competition that helps eliminate subsidies and forces governments and private industry to recognize the true costs of building centralized generation and transmission reveals the value of decentralized solar energy. Solar also has a role to play in rebuilding areas destroyed by war and disasters, as an alternative to restoring conventional energy systems. Solar simultaneously solves many different problems.

Countries are also implementing specific policies to encourage solar energy on a large scale. Spain's royal decree is a significant example for concentrating solar power. There are also new international organizations and policy mechanisms developing that could boost solar energy

development, particularly in regard to combating climate change and the growing demand for green power. Foreign aid budgets in certain areas are growing, creating new opportunities for solar to be included in U.S. development policies. There are opportunities for expanding collaboration across agencies, and leveraging multilateral activities. Successful market aggregation to reduce the transaction costs of significant solar energy development could have significant benefits.

Further development of standardized, packaged solar systems that are reliable, validated and easy to use could solve some of the key problems involved in design and installation of solar systems. The opportunities for solar energy could also be expanded by more effort to identify opportunities for hybridization and diesel displacement, particularly finding productive uses that enhance economic development.

Opportunities to develop partnerships with organizations that can help with financing mechanisms is important – financing is a major barrier to expanding solar energy use internationally.

Energy is a critical component in economic development. The absence of functioning economies in many underdeveloped countries ferments unrest, and contributes to poverty, regional instability and often terrorism. By providing applications that contribute directly to remote, off-grid micro-businesses, education, potable water provision and other quality of life issues, solar energy technologies and the DOE international solar programs have an opportunity to provide an important contribution to national security.

Threats

International solar energy activities – and solar energy in general – compete with other Administration and Congressional priorities. Priorities and attitudes in foreign governments the U.S. works with also shift. The conflict with Iraq and tension between the U.S. and its allies may strain international relations on many fronts, including cooperation on renewable energy development. Domestically the war on terrorism and the economy are dominating policy debate, pushing energy and environmental issues farther down the agenda. U.S. attitudes toward GEF funding and other international cooperation have created a difficult environment. Concern with sharing knowledge and information with other countries waxes and wanes, dampening opportunities for productive collaboration.

Subsidies, incentives and policies to support solar energy can be a two-edged sword. While they can sometimes open markets and create new opportunities for sustainable solar development, if they are poorly implemented, underfunded, or abandoned prematurely they can seriously damage the development of self-sufficient markets for solar technologies, as well as the reputation of the technology itself. In the past, programs that gave away subsidized solar systems without involving industry have actually pushed viable solar companies out of business, and left in their wake systems that had no infrastructure to provide the repair and maintenance needed to keep them operating. Companies may overbuild capacity to meet the demands of large-scale subsidy programs, but unless a sustainable market develops as a result of these programs the solar industry can be left with excess capacity that drives down prices and undermines profitability.

Designing supports for solar energy requires careful attention to the intended and unintended consequences of policies, and planning for transition out of subsidized markets.

Despite progress, there are still significant subsidies and other supports for fossil fuels and nuclear energy that put solar at a disadvantage. Markets don't reflect all of the advantages of solar energy, or all of the disadvantages of solar energy's competition.

Too much concentration on projects and programs rather than building infrastructure is a threat. To last, solar systems need maintenance and warranties and other infrastructure that only develops in a viable market. Over the long-term, projects that fail because the infrastructure to keep them operating never developed are a detriment to solar energy.

The cadre of solar researchers and program managers is aging, just like the Federal government and society as a whole. Uncertainty over future funding and budget requests that eliminate whole categories of funding discourage the next generation of researchers from becoming involved in solar energy.

Competing technologies are not standing still. The competition solar energy faces today will be different from the competition it faces to provide the same services 20 years from now. Distributed generating technologies like fuel cells and microturbines can be attractive for village power, particularly if they are combined with modular biomass gasification that reduces the need for fuel delivery.

Competing countries are not standing still. In addition to substantial R&D budgets and major market incentives, foreign competitors effectively use tied aid to advance their own industry.

There are gaps in data and information on issues such as reliability that could cause problems for solar energy's future. There is not enough follow-up and tracking of installations to ensure that consumers are getting full value from their solar energy systems.

Annexes:

1) Meeting Agenda
2) Raw Notes from Meeting
3) Presentations from Meeting

Appendix 1 – International Planning Meeting Agenda

DOE Solar Program
International Programs Strategic Planning

When: Thursday, December 19, 2002

Where: Maritime Institute, Baltimore, MD

Invitees:

DOE/SP:	Ray Sutula, Lynn Gillette, Richard King, Tex Wilkins, Bob Hassett, Dan Ton, Tom Rueckert
DOE/WI:	John Millhone, Thom Sacco, Andre van Rest, Rick Moore, Charlie Llenza, Harvey Major, Ronald Shaw
USAID/EGAT:	Griff Thompson, George Like, Patricia Flanagan, Erik Streed
World Bank:	Ted Kennedy
Sandia:	Paul Klimas, Craig Tyner, Charlie Hanley, Michael Ross, Max Harcourt, Ward Bower, Dan Horschel
NREL:	Roger Taylor, Jack Stone (via Video or Telcon), Ron Benioff, Larry Kazmerski, Dave Renne, Debbie Lew, Mark Mehos, Tom Surek, Tim Merrigan
SWTDI:	Robert Foster
FSEC:	Jim Dunlop
IEA/PVPS:	Chuck Linderman, EEI; Mark Fitzgerald, IST
Resource Assesment:	Fred Morse, Morse Associates; Richard Perez, ASRC University at Albany

Background: This meeting, which convenes the DOE/EERE, AID/EGAT, Laboratory, RES international teams and other interested parties to develop an integrated approach to planning and managing international activities, is the first part of a two-part planning session requested by Ray Sutula as a means of understanding, planning and coordinating DOE's (particularly SP's) international renewable energy programs. This first part is limited to DOE/SP, DOE/WI and AID/EGAT as the primary agencies involved in funding international renewable energy activities. It will focus mainly on DOE/SP (PV and Solar Thermal) international activities. The second part, to be held after Jan 1, 2003, will include other DOE/EERE offices, other DOE and USAID offices, and other interested stakeholders (e.g., World Bank, OAS, SEIA, AWEA), and will focus on strategic coordination of future activities.

Meeting Objectives:

- To review current international activities sponsored/supported by DOE/SP and other agencies.
- To update DOE/SP's long-term international program goals and priorities.
- To update near-term objectives to realize those goals (a road map).
- To reaffirm strategic alliances, and consider new alliances.

- To develop methodologies for an integrated approach to the effective monitoring and coordination of international activities.

Desired Outcomes:

- Establish the importance and relative priority of international activities within DOE/SP
- Establish an international strategy for Solar Programs
- Form a coordination working group to facilitate international program collaboration
- Establish a Road Map to achieve the DOE/SP strategy

Agenda

- 0730 – 0800 Coffee and Introductions
- 0800 - 0810 Introduction and Expectations — Ray Sutula
- 0810 – 0820 AID/EGAT/EIT/Energy Program Overview — Erik Streed
- 0820 – 0830 World Bank Program Overview — Ted Kennedy
- 0830 - 1200 ***BRIEF*** (5 - 15 min) Summary of where we are
  (Current activities, value/benefit, outcomes achieved, funding sources and budgets)

  [15 Min Break at 1000]
  - DOE/SP Perspective [15 min] — Bob Hassett
  - International Energy Agency [20 min] — Ward Bower/Craig Tyner
  - Sandia National Laboratories Overview [40 min] — Max Harcourt
    - US-Mexico-Canada Bi/Tri-Lateral Agreements — Michael Ross
    - Mexico Renewable Energy Program — Michael Ross
    - Central America — Max Harcourt
    - South America — Charlie Hanley
  - National Renewable Energy Laboratory Overview [40 min] — Roger Taylor
    - US-China Bi-Lateral Agreement — Debbie Lew
    - US-India MOU Support — Roger Taylor
    - Asia — Roger Taylor
    - South America — Roger Taylor
    - Africa — Roger Taylor
    - Village Power — Roger Taylor
  - NMSU/SWTDI International Programs [15 min] — Robert Foster
  - FSEC International Programs [15 min] — Jim Dunlop

- 1200 - 1300 LUNCH

- 1300 - 1500 Discussion of where we want to go — Led by Kevin DeGroat
  - *Ground rules: Please take side discussions into hall. Please avoid interrupting during round robin input – there will be a chance to comment at the end of the input step. Please put up with the process – processes are never perfect but if we start changing now it will take away time from productive work.*
  - Review of the Department of Energy's International Objectives; EERE's current international program objectives; and DOE/SP's international program objectives. *(Round robin additions to collection of objectives. Comments on objectives. What objectives are missing? Round robin opportunity to add to list.)*
  - Who are our current strategic partners? (*Round robin contributions from participants. Comments on list.)*
  - What new initiatives are being implemented/considered that are relevant to EERE/SP? (round robin contributions, short statements on their relevance for solar technologies)
    - Clean Energy Technology Export Initiative
    - Global Village Energy Partnership
    - New IEA PVPS Tasks
    - Int'l Resource Assessment Initiative
  - What are the relative priorities of the objectives defined in the discussions above and the activities supporting them? *(Participants asked to rank the 3 most*

important objectives and the three least important objectives for solar on note cards. Participants asked to list the 5 most important activities for solar on note cards. Discussion of rankings to combine and clarify)

- What are the strengths, weaknesses, opportunities and threats involved in the current program, from a solar program perspective? *(Each participant will be asked to list 4 strengths, 4 weaknesses, 4 key opportunities, and 4 important threats. Participants read 1 at a time from note cards starting with strengths. Participants asked to combine inputs as they read them out. Review of list, open for comments on any major omissions.)*
- How do the described activities support DOE objectives, and those of our strategic partners? *(round robin comments)*

- 1500 - 1600 Organize to get where we want to go
  - Virtual/Actual Teams to Implement Integration *(Start with discussion of four proposed approaches: Customer Set, Geographically, By Technologies, By Applications with short explanations from Max Harcourt and Bob Hassett. Open floor for alternatives/additions. Start with Customer Set approach and ask first participant for one pro and one con for this approach. Proceed around room until no more inputs are offered. Proceed through remaining alternatives. Given pros and cons of implementation approaches, ask each person to vote for the most promising approach. Open floor for discussion/clarification.)*
  - DOE/SP International Road Map Development *(Who are the players? Round robin nominations in the categories of industry, laboratory, university, NGO, Federal, Other drawing on the list of activities as a starting point. Discussion of best approach to starting roadmap development: develop strawman/outline of roadmap? Facilitated meeting like this? Series of meetings with comments on products in between? Steering committee?)*
- 1600 - 1630 Immediate Next Steps
  - Plan for Second Part of the Planning Meeting *(Where. When. Who. Meeting Topics.)*
  - Preliminary Actions to Coordinate International Activities *(Coordination Committee, Road Map, Assignments)*
- 1630 - 1700 Summary and Action Item Review

Annex 2: Raw Meeting Notes

DOE Solar Program
Notes from the Solar International Programs
Strategic Planning Meeting
December 19, 2002

Purpose of Meeting:

- Review current international activities
- Update international program goals and priorities
- Reaffirm strategic alliances and consider new alliances
- Develop an integrated approach to monitoring and coordinating international activities

Introductory remarks by Bob Hassett and Ray Sutula:

- The goal is to leverage international collaboration in ways that will benefit the solar program
- A strategic plan will be developed to achieve this goal
- The intention is to collaborate with the other technical groups within DOE

Drivers/Framework for Action:

- The desire to increase US market share in solar technologies
- National Energy Policy
- DOE's strategic plan
- Solar's strategic plan

Discussion:

- The market share argument was debated due to the globalization of companies (particularly in the production of equipment) [The role of small and medium-sized US companies could also be considered]. The consensus seemed to be that since this industry impacts the US economy, it should be considered as a key driver in the strategy development.
- It was noted that US industry has appreciated DOE's role and that it is necessary to define an appropriate role. The US industry roadmap defines the need for US government involvement.
- The comment was made that DOE has multiple missions: it is a political institution, driven by policy. It is also driven by the goal of creating and deploying technology. It is US focused and driven.

Note: All presentations will be posted on the Internet. Comments below are included insofar as they may tie into the development of a strategic plan.

Presentation and Discussion: Overview of USAID Programs by Erik Streed

- USAID views renewable energy as a means to an end, i.e. a way to contribute to other strategic objectives
- There could be a role for DOE collaboration in the Global Village Energy Partnership (GVEP). USAID is still gathering financing for this initiative.
- USAID does not currently support industry "matchmaking" through this initiative

- There are three proposed initiatives stemming from WSSD, each led by a different agency
- The multi-agency Clean Energy Technology Initiative (export focused) is competing for funds with the WSSD proposals

Presentation and Discussion: Overview of World Bank Programs by Ted Kennedy

- Projects under development: GEF geothermal guarantee fund for Eastern Europe, "productive uses" program (linking clean energy to income generation), and the Shell-sponsored "million connections fund"
- Climate change is of increasing importance to the Bank, particularly the area of vulnerability and adaptation (climate impacts could unravel the Bank's other development work)

Presentation and Discussion: Overview of IEA Programs by Craig Tyner (CSP)

- Solar PACES includes both suppliers and users of CSP technologies
- Industry is on the executive committee
- Discussion of membership fees
- Companies are trusted to represent the industry as a whole and not just their own corporate interests. Participation is rotated.

Presentation and Discussion: Overview of IEA Programs by Ward Bower (PVPS)

- One-on-one discussions make international meetings an important venue for breaking down policy barriers and finding information that is not available elsewhere
- US has not taken the lead on any tasks, but there is a desire to have the US lead a Task 10
- Mark Fitzgerald noted that Task 9 meetings (renewable energy) are sometimes hosted in non-member countries to try to more fully engage them. There is a request (led by the U.K.) to extend this program
- Outcomes include key documents, best practices
- There is also value in learning how other countries think about the issues at hand
- There are lots of potential overseas markets to tap (e.g. China, Asia, Africa, Latin America…)
- Participation (in Task 5) has prevented bad standards from becoming laws in Europe (and therefore, barriers to US exports)
- Task 2 has created a good source of information through its operational database

Presentation and Discussion: Overview of Sandia Programs

- Joint USAID/DOE support is critical
- The human side (know-how) is essential for the technology to work in practice
- Measuring sustainability is important. Annual reviews, indicators are important.
- Technology must be appropriate (Mexico is a good example of this; could replicate)
- Existence of both bilateral and trilateral projects is due to political drivers

Presentation and Discussion: Overview of NREL Programs

- Even with $6.5 million, programs barely address the threat of global warming

Little discussion time after SWRES and FSEC presentations

Objectives as Listed on White Boards

National Energy Policy : Recommendations to Strengthen Global Alliances

- Promote market-based solutions to environmental concerns
- Support exports of us clean energy technologies and encourage their overseas development
- Engage bilaterally and multilaterally to promote best practices
- Explore collaborative international research and development in energy alternatives and energy efficient technologies
- Explore innovative programs to support the global adoption of these technologies

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EERE's International Objectives

- **Address Emerging Global Environmental and Energy Issues**
  - Participation in international negotiations, conventions and treaties
  - Sustainable development, climate change mitigation, biodiversity conservation
- **Promote Trade and Market Development**
  - Promote exports of US products and services in clean energy and energy efficiency
- **Promote Energy and Environmental Security**
  - Reduce risk to US international interests
  - Enhance regional stability consistent with US foreign policy
  - Foster democratic and institutional capacity building
  - Address significant local energy and environmental concerns
- **Conduct Cooperative Research and Development**
  - Leverage funding
  - Leverage knowledge

EERE International Activities to Date

- Cooperation on regional clean energy programs
- Support for JI and CDM pilot projects
- Training and technical assistance
- Promotion of US technologies abroad
- Information dissemination and support for policy and tariff reforms
- Assistance in identifying project financing options
- Participation in multilateral and bilateral R&D agreements
- Disaster relief and contingency planning

Photovoltaic Objectives

- *Maintain the US industry's worldwide technological leadership*
- Achieve economic competitiveness with conventional technologies

- Maintain a sustained PV market with accompanying production growth
- Make the PV industry profitable and attractive to investors

Parabolic-Trough Technology Roadmap – Proposed International Initiatives

- Increase US content of domestic and international trough projects
- Provide a mechanism for US companies to collaborate with Europeans, Israelis, and others to promote development of international trough projects

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IEA Objectives

- Contribute to Cost Reduction of PV Applications
- Increase Awareness of Potential & Value
- Foster Market Development by Removing Tech. & Non-Tech. Barriers
- Enhance Tech. Cooperation with Non-IEA Countries
- Information Dissemination (ETIC)

USAID Objectives

- Use Energy as Tool for Other Development Objectives
- Use Energy as "Productive" Use for New Business
- Increase Access to Energy

U.S. Industry Roadmap

- Foster Domestic and Int'l market for PV
- Support Nat'l & Int'l Standard for PV prods & components
- Infrastructure – Codes, Standard

Added Objectives

- Maximize and Expand Exchange of Technical Information to Benefit U.S. Program
- Support National Security Missions – Technical Assistance and Advisory Role (Philippines – Muslim Areas – Nation Building)
- Facilitate Cross – Technology Solutions to Client Needs

- Enhancing Energy Security and Independence
- Helping people and Organizations to know how to use solar
- To know when to use solar
- ? Develop Outreach and Public Education program

- Accelerate establishment of self-sustaining EERE markets and business in developing and transition countries
- How does this help the US PV industry?
- How to create viable trading partners and good customers?

Comments on Objectives

- Have to be careful about industry issues
- U.S. industry is a working keyword for budget – and U.S. expansion will help RE overall

- There will always be fire drills despite objectives
- If we have a high-level goal, it might help keep our direction

Is International Competitiveness a Rationale?

- Solar companies are multinational – manufacturing in global markets
- IEA, AID, WB, other agencies have different views on U.S. base
- Industry has a global outlook
- But, U.S. companies are interested in market share
- Multiple missions have to fit in strategy ~ deployment, technology, policy, business development/trade are linked

- Depends on what policy/people say at other levels
- Solar US, Int'l objectives – Mixed objectives
- Development
- Trade (Competition and Revenue)
- Development is more than Solar

- Congress focuses on U.S. industry – But industry is multinational – issue is where they add value
- Learn from/leverage knowledge R&D program -- does a lot of international that is invisible – students, exchanges -- hidden international programs

Comments

- Belief in "Open Source" value to increase innovation; trying to limit knowledge/markets leads to less overall
- Sustainability underlies security/environment/trade
- Transforming what we have to sustainability
- Innovation – something new – we are doing
- We don't have "arrows" to promote trade
- Inventory of commitments from policy/int'l

Criteria for Strategic Partners

- Those that have resources
- Compatible policy
- Political clout
- Influence/Credibility
- Current international activity with energy component
- Need to partner – we both have something to offer
- Partner with knowledge to share with us
- Proven track record

Teaming Issues

- Village power workshops were communications – got away from nuts & bolts
- Just now getting beyond PV/CSP being split – stove-piped

- Sandia/NREL – Come across as separate
- Lack of information on what DOE international is doing?
- AID/Winrock & major implementators outside DOE need to be engaged
- Charlie – DOE Int'l program – a level of detailed sharing
- V w/ sister programs – panels/posters
- Mexico program – among stakeholders – invite organization reps
- RE – WRDE
- Formulate a WG to layout a strategic plan

Partners

Financial And Insurance Industries (KfW for example)	USAID	World Bank
State	ENERSOL	Winrock
Nature Conservancy	Turner Foundation	SEIA
Abel Foundation	Shell Foundation	Pew
Energy Foundation	NRELA	SELF
ISP	WRI	ISES/ASES
RMI	EE Sustainable Development Centers	NRDC
WWF	Conservation International	World Conservation Fund
ULS	Greenpeace	GREENSTAR
Congress	UN	Host Country Ministries
Dept. Of Commerce	USDA	EPA
EXIM	TDA	Host Country Businesses
Other DOE Units	IEA	UNDP
APEC	GEF	CITIES
DOD	NASA	UNEP
Universities	State Programs	RUS
FEMA	ASERTTI	WHO

Initiatives

WSSD-GVEP-ESSE
Admin climate change policy
Clean energy tech. Export
In country initiatives
UNEP/ITU wireless/rural info and comm. Tech
Bilateral/trilateral/multi commitments-MOUS/agreements
WB/GEF large scale solar
Spanish decree
1,000 MW initiative international components

SWOT ANALYSIS

Strengths

- Resources: People and facilities
- Progress in standards development
- Positive outcomes in info sharing, R&D
- Clean energy
- Global resource
- Evolving coordination among programs
- Technology breadth and depth
- Long term commitments
- High level in country access, strong intergovernmental relations
- Existence of bi and multi-lat collaboration
- Strong recognition of national lab roles
- International markets are the major markets for PV
- We have tech. Validation of US products
- We are objective, not tied to companies
- Quality work
- Respected technical information, credible
- Guidance and assistance
- Proven track record
- Cadre of lab and contractor staff with developing country experience and cultural sensitivity
- Complementary US focused activities (particularly in Indian country)
- Highly leveraged programs, money, technical capability, established partnerships with similar interests in the country and across agencies
- Few competitors
- Knowledge base experience
- Lowest cost/best solution for many apps
- Mature reliable technology
- Profitable PV industry
- Sustainable source of power-process for achieving
- Secure source of energy, energy independence
- International community beyond US experienced
- Practice international community of practice
- Past work has provided good basis: AID, WB, DOE
- Countries with interest have solar resource
- Many host companies want to work with US
- US technologies have a good reputation
- Strong R&D collaborations-resources, networks, training, knowledge

Weaknesses

- Relatively low funding compared to Spanish, Dutch, etc.

- Policies regarding foreign travel policies-too slow
- Cloudy vision/direction-unsustainable due to political shifts-can't maintain focus
- Lack of funds/uncertainty of funds
- No single clearinghouse for info
- Fragmented efforts, shotgun approach
- No industry-CSP
- No market-CSP
- Not always lowest cost (PV)
- Need beta systems integration
- Results not disseminated enough
- Goals are too small
- Bureaucracy
- US central vision-limited support, limited scope
- Tech focus rather than application focus
- Upfront costs means financing
- Lack of infrastructure in countries
- Unknown commodity
- Insufficient social science R&D user-side
- Often reduced to tech. Push
- Lack or low involvement of US industry
- Lack of support/buy-in
- Long term data missing, so solid cost evaluations not possible
- Where economic drivers exist, there is a lack of human and financial capability
- Poor cross-tech coordination and collaboration-labs as on (?), overlap of activities
- Unresolved QA issues
- Potential interference in the industry
- Climate change dynamics ignored
- Links to markets and future profitability and learning opportunities ignored
- Ignoring all dimensions of security-US and developing countries
- Focus on solar marginalizes-US weatherization? In international programs?
- Open source-track record on that is bad-audio VCR syndrome
- Solar production pollution
- Diminishing US ownership of industry
- Lack of certified PNP products
- Inherent complexity of technology
- Rapidly losing R&D leadership in EERE-lower funding then competitors
- Inability to do MYP due to funding cycle

Opportunities

- Solar resources have barely been realized
- Negative implications of neglecting rural development
- Volatility of energy market
- Evolving energy policy because of global warming
- Privatization

- ID of diesel and hybridization
- Rebuilding of war zones-Disaster areas
- Worldwide high-resolution coherent (?) solar resource data
- Other agencies/Institutions working for partners
- Gather info on standalone systems from developing countries
- Funnel other institution activities into DOE activities for sustainability
- More groups to develop finance mech.
- Country specific policies-Energy is becoming a good investment compared to the internet
- Focus in H2 economy and infrastructure
- Emphasize "planetization," US globalization, sustainable US resource (?)
- New initiatives
- High end of international budget
- US participation with IEA-increase
- Industry support and participation on program
- WB support
- Strategy for managed transition from subsidized to sustainable market growth
- Technology neutral and optimized energy solutions
- Benefit of market aggregation
- Environmental/climate change benefit valuation
- Ability to enhance collaboration with other EERE programs
- Comprehensive EERE strategy plan
- Solar simultaneously solves different issues
- Market niches where solar is the solution
- Develop validated, standard reliable packages for solar
- Improve process for getting money from overseas sources
- 2.4 billion people without electricity
- Leveraging multilateral activities
- Growing demand for energy (rural)
- Team collaboration across agencies
- Many overseas programs developing
- Growing foreign aid budgets
- Growing international support for RE
- Greater awareness of energy/poverty connection, health, education linkages
- Support from developing world for collaboration
- Way to address security issues
- Way to address environmental degradation
- Shift from household electricity to productive and social apps-solution packages-creates need DOE can fill
- Growing demand for green energy/ opportunity for X-border trades
- Growing demand for DER
- Growing demand for energy security
- Opportunities to advance solar technology

Threats

- Changing administration and changing priorities: domestic and foreign
- Lack of communication
- Unrealistic and unsustainable market growth supported by subsidies
- Lack of planned transition out of subsidized markets
- Shortage of novel/ties-foreign
- Perception of US knowledge leakage
- Lack of education and misconceptions
- Dearth of capability building
- Dismantling of DOE
- US intervention on GEF funding-the UN scenario-negative attitude of agencies to US
- Concentration on projects rather then infrastructure
- Lack of trained installers
- Funding declining
- Bureaucratic limitations
- Competing technologies
- Decreasing US market share
- Overseas competition
- Administration and Congress
- Poor collaboration between agencies
- Not focusing
- Reducing funds discouraging next generation of researchers
- Favoritism for fossils/"cheap" energy
- Climate/resource issues
- Well-funded foreign donors (tied aid)
- Reliability and systems-large scale performance
- US does not lead by example
- Don't know opportunities for lack of data--we only know low-hanging fruit

Teaming Issues

IEA across technologies
Mexico Annex I-listing and disseminating info. to see overlaps
List all of our components
Get away from pushing technology and towards solutions
Heard more on lack of resources rather then overlap
Ruler is doing across RE
Mapping where we are at-we need that
"On the ground" people are coordinating-DOE HQ doesn't know
Annual international forum at DOE? More in-depth than this A.M.
Old SNL program review meetings

Next Steps

WL to develop a strategy, digest this info – comp up with next steps
Resistance unless blessed by Garman? Has expressed support
Present what we got here – then Richard, then David Garman

Eric – appearance that labs are all trying to do everything – NREL has good rep. For resource – But in other areas they are not different
Charlie – not everyone with field is coordinated
T. Saul – Biomass has no resources. Wind is being told their industry DOE only want int'l done
Chris – Have roadmap guidance, but should go back to them about it – have them convene a group
Charlie – Go out and visit industry

Working Group
Max Harcourt
Erik Streed
Bob Hassett
Roger Taylor (nominated)
Robert Foster – RES
University – Richard Perez
Winrock – Chris Rovero and alternate
Mark Fitzgerald
Tommy Rueckert
Harvey Major & alternate
Ted Kennedy

Timeline
10th of February
January 31st-RAW

Appendix 3: Presentations from Meeting