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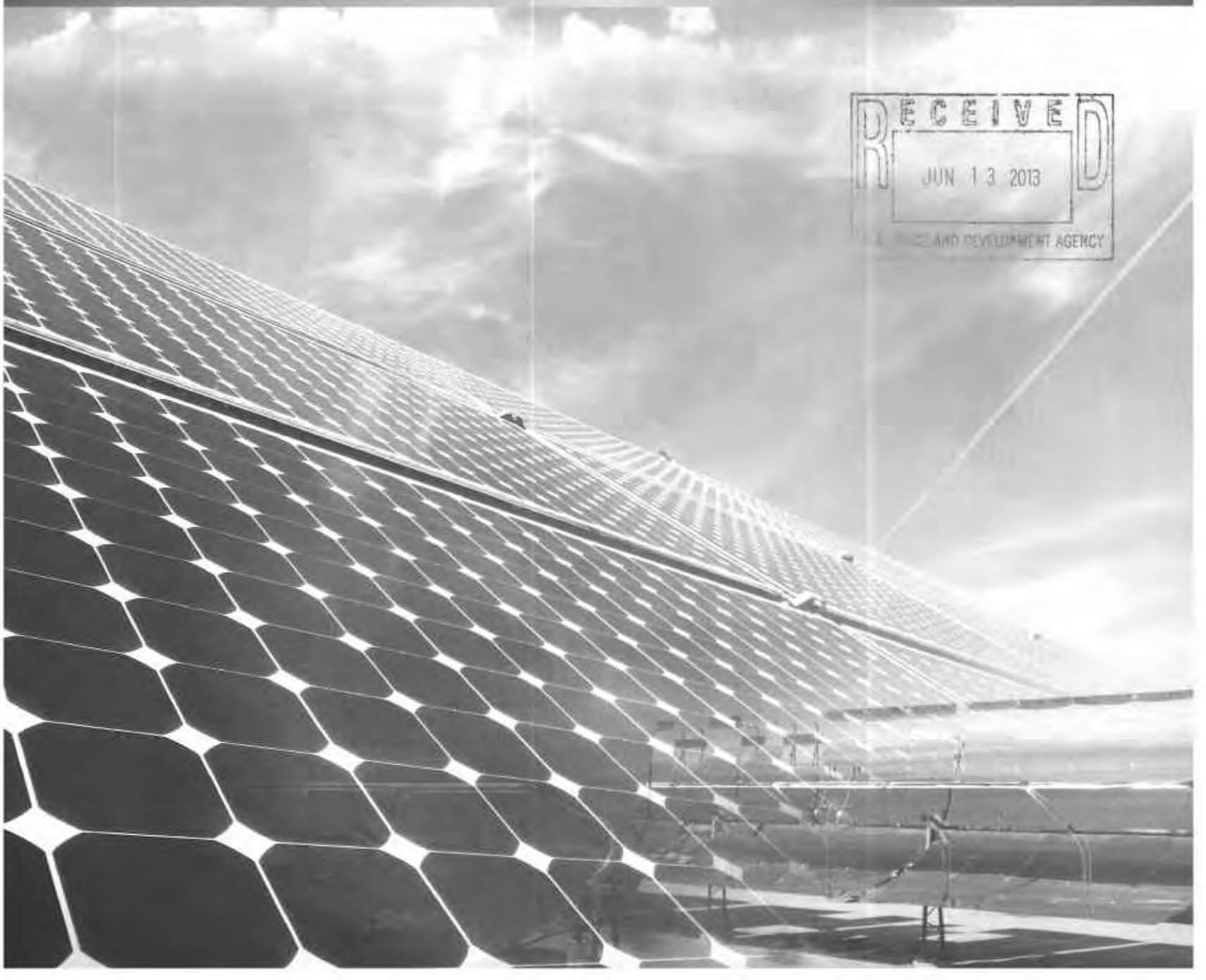
U.S.-SOUTHERN AFRICA SOLAR WORKSHOP

Partnering to Power Southern Africa's Future

Johannesburg, South Africa • May 21-22, 2013

WORKSHOP HANDBOOK



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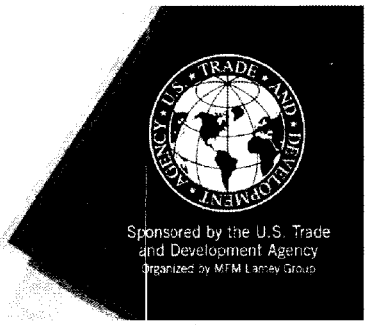
Partnering to Power Southern Africa's Future

May 21-22, 2013 - Hyatt Regency Johannesburg - South Africa



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ACKNOWLEDGEMENTS

The U.S. Trade and Development Agency would like to acknowledge the support and assistance of the following corporate sponsors and supporting organization whose invaluable assistance contributed to the success of this workshop.

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The U.S. Trade and Development Agency (USTDA) advances sustainable infrastructure and economic growth in sub-Saharan Africa by funding project planning activities, pilot projects, and U.S. study tours. USTDA activities promote the use of U.S. goods and services for priority development projects that help build the infrastructure for trade.

USTDA Programs

USTDA promotes economic growth in emerging economies by facilitating the participation of U.S. businesses in the planning and execution of priority development projects in host countries. The Agency's objectives are to help build the infrastructure for trade, match U.S. technological expertise with overseas development needs, and help create lasting business partnerships between the United States and emerging market economies.

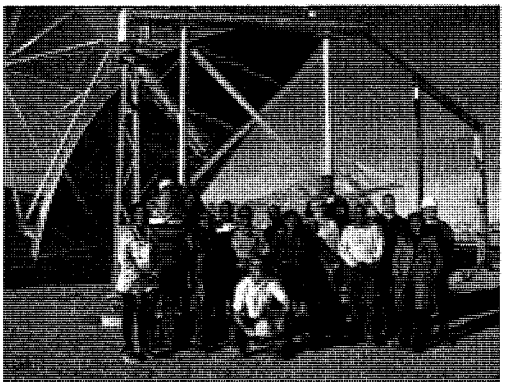
USTDA advances these objectives through its two key programs, the International Business Partnership Program and the Project Development Program.

U.S. study tours are the mainstay of USTDA's International Business Partnership Program (IBPP). Created in 2010, the IBPP is USTDA's signature program for linking U.S. technologies and expertise to priority development projects. These visits are carefully planned to enable overseas project sponsors to meet with U.S. businesses, technical experts and policymakers and financiers that can help them achieve their development goals. These study tours also provide delegates with an opportunity to tour industrial development sites in the United States and to observe the manufacture and demonstration of state-of-the-art technologies first-hand.

Through feasibility studies, technical assistance, pilot projects and other forms of project planning assistance, USTDA's Project Development Program helps overseas project sponsors identify technological solutions and sources of financing for priority infrastructure projects.

Global Solar Energy Activities

Clean energy is a strategic priority for USTDA. The Agency works with qualified project sponsors to identify and support a wide range of clean energy activities that generate measurable development and commercial results. With solar energy now being generated at scale, opportunities in emerging markets have increased rapidly. By funding solar project planning activities and connecting U.S. technology and services to priority development projects in the solar sector, USTDA is helping to sustain impressive growth in the sector.



Representatives of Southern Africa's solar power sector participate in a USTDA funded study tour in Daggett, California in January 2013

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Colombia 20 MW Hybrid Solar and Wind Plant

USTDA is providing a grant to Celsia for a feasibility study to determine the technical, economic and financial viability of a 20 MW grid-connected, hybrid solar and wind park in the department of Atlántico.
Celsia is a publicly listed utility and Colombia's fourth largest power producer. Solar and wind generation will allow Colombia to diversify its energy portfolio, currently highly reliant on hydropower and subject to long arid season caused by swings in international weather patterns.

Southern Africa Solar Power Initiative

Southern Africa has some of the highest potential for solar power generation. Through a series of study tours, a technical workshop, and project planning activities, USTDA is fostering partnerships between the United States and Southern Africa in the sector. The first study tour of the initiative took place in January 2013, and included delegates representing public sector and financing organizations from Southern Africa. The delegates participated in meetings with U.S. government and private sector representatives, and visited technology labs and solar power plants across the country.

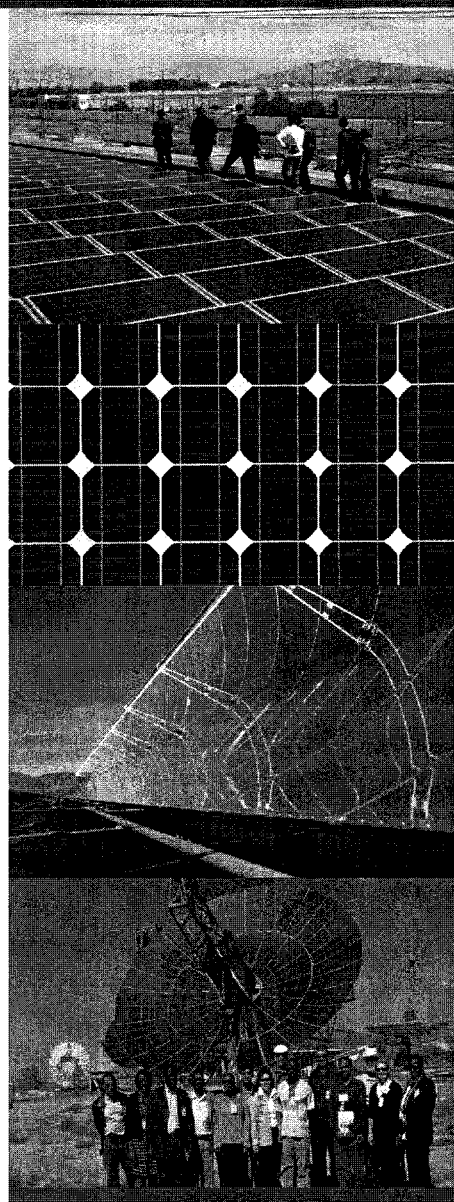
A U.S.-Southern Africa Solar Workshop is taking place in Johannesburg from May 21-22, 2013, and highlighting regional solar projects and initiatives; U.S. solar technologies; and policies, standards, and financing mechanisms that can support innovation and sustainability in the solar power sector. A second study tour will follow in September 2013, focusing on the development of business-to-business partnerships by including private sector representatives from Southern Africa's solar power sector. By investing in Southern Africa's solar power sector, USTDA is increasing energy security and economic growth capacity in the region.

Jordan Photovoltaic Solar Power Plant

Jordan has virtually no indigenous energy resources, and energy imports account for nearly 10% of its GDP. With energy demand expected to rise by 50% over the next 20 years, increased access to reasonably priced indigenous energy sources is crucial. This USTDA-funded feasibility study will include a detailed assessment for the implementation of a 100 MW photovoltaic power plant that is expected to go into production by the end of 2012, with a planned expansion to 200 MW by 2015.

India Rural Micro-Grid Power

India's rapid economic expansion and population growth are placing a growing strain upon the country's energy infrastructure. Approximately 400 million people in villages do not have grid connectivity. In light of this significant shortfall, India's federal and state level governments are looking to increase the country's off-grid electricity generation via solar power. To further this goal, USTDA is supporting Azure Power in its efforts to develop a Rural Micro-Grid Solar Power project that will be deployed in remote non-electrified villages in India. USTDA is partially funding a feasibility study that will assess and provide planning assistance for two 500 kilowatt photovoltaic pilot projects in the states of Chhattisgarh and Gujarat.



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Through feasibility studies, technical assistance, pilot projects and other forms of project planning assistance, USTDA's Project Development Program helps overseas project sponsors identify technological solutions and sources of financing for priority infrastructure projects.

African Clean Energy Solutions Initiative

The centerpiece of USTDA's clean energy strategy in sub-Saharan Africa is the African Clean Energy Solutions (ACES) Initiative. Focus areas of the initiative include: (1) supporting power generation using clean energy sources; (2) modernizing transmission and distribution grids; and (3) promoting energy efficiency and demand-side management. Under this initiative, USTDA has contributed to developing clean energy projects with partner agencies. Intergovernmental initiatives include:

The U.S.-Africa Clean Energy Development and Finance Center (CEDFC) is an initiative by USTDA, the Overseas Private Investment Corporation (OPIC) and the Export-Import Bank of the United States to provide a coordinated approach to clean energy project development in sub-Saharan Africa. CEDFC is providing U.S. and sub-Saharan African energy project developers with a centralized means to identify and access U.S. government support for their clean energy export and investment needs.

The U.S.-Africa Clean Energy Finance Initiative (ACEF) is an innovative financing mechanism developed by USTDA, the U.S. State Department, and OPIC. The initiative aligns USTDA's project planning expertise and OPIC's financing and risk mitigation tools in new ways, to support private sector investment and increase support for U.S. businesses and exports in sub-Saharan Africa's clean energy sector.

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Transmission and Distribution

Access to a stable electricity supply is a critical driver of sub-Saharan Africa's economic growth. In Ghana, USTDA funded a feasibility study for Ghana Grid Company (GRIDCo) to determine the technical and economic viability of expanding Ghana's electricity transmission network with a new 330 kilovolt power transmission line. When implemented, the project will create nearly 150 miles of new transmission linkages in southwest Ghana, stabilizing electricity supply in the sub-region and bringing access to electricity to areas previously disconnected from the national grid.

USTDA is also working with the Electricity Company of Ghana (ECG) to evaluate the critical aspects of a smart grid applications project in southern Ghana. By providing recommendations for a system that will address business process planning and decision making and by providing training to ECG staff, USTDA is playing a critical role in bringing sustainability to ECG's infrastructure.

In Nigeria, USTDA partnered with the National Power Training Institute and three electricity distribution companies (Abuja, Eko, and Ikeja), to provide technical assistance (TA) in assessing the companies' electrical distribution infrastructure. The TA also makes recommendations on smart-grid and outage management technologies, and provides training to the companies' senior engineers and technicians.

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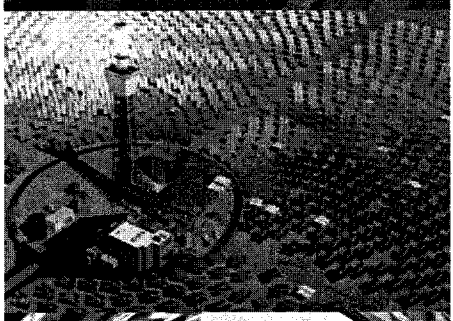
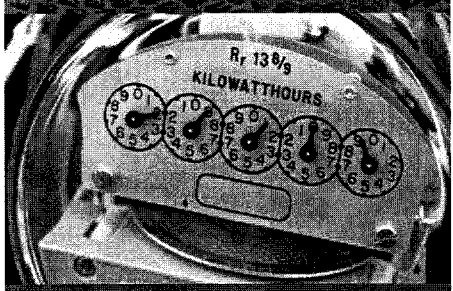
Geothermal

Geothermal reserves in East Africa's Rift Valley have the potential to significantly increase the region's generation capacity. In Kenya alone, the World Bank estimates 10,000 megawatts in geothermal potential. To help capitalize on this potential, USTDA provided technical assistance to Kenya's Geothermal Development Company (GDC). The grant provided capacity training to GDC personnel, assisted in the development of feed-in tariffs supporting geothermal power generation, and established evaluation criteria for potential sector investment partners in these efforts.





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MOBILIZING CAPITAL IN SUPPORT OF CLEAN ENERGY PROJECT DEVELOPMENT IN AFRICA

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The U.S. Trade and Development Agency (USTDA) is a U.S. foreign assistance agency operating with an office in the U.S. Consulate in Johannesburg, South Africa. USTDA funds project planning activities, pilot projects, conferences, and study tours in support of partner countries' sustainable infrastructure development and economic growth priorities.

USTDA Programs

USTDA promotes economic growth in emerging economies by facilitating the participation of U.S. businesses in the planning and execution of priority development projects in host countries. The Agency's objectives are to help build the infrastructure for trade, match U.S. technological expertise with overseas development needs, and help create lasting business partnerships between the United States and emerging market economies.

USTDA advances these objectives through its two key programs, the International Business Partnership Program and the Project Development Program.

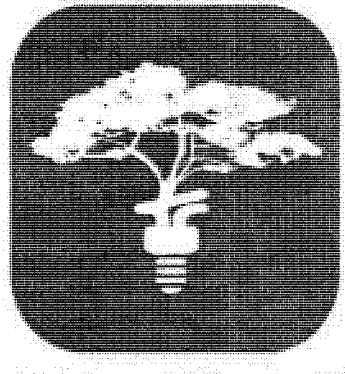
USTDA's reverse trade missions (RTM) are the mainstay of its International Business Partnership Program (IBPP). Created in 2010 in response to President Obama's National Export Initiative, the IBPP is USTDA's signature program for linking the U.S. private sector to foreign buyers. These visits are carefully planned to enable foreign decision makers to meet with U.S. businesses and to observe the manufacture, and demonstration of U.S. goods and services that can help them achieve their development goals. These RTMs also include meetings with financial institutions to observe financing options and technical and regulatory bodies that can assist with strengthening the project sponsor's technical capacity.

Through feasibility studies, technical assistance and pilot projects, USTDA's Project Development Program helps overseas project sponsors identify technological solutions and various sources of financing for priority infrastructure projects.

U.S.-Africa Clean Energy Development Finance Center (CEDFC)

The U.S.-Africa Clean Energy Development Finance Center (CEDFC) is an initiative by the U.S. Trade and Development Agency, the Overseas Private Investment Corporation and the Export-Import Bank of the United States to provide a coordinated approach to clean energy project development in sub-Saharan Africa.

The mission of CEDFC is to assist sub-Saharan African energy developers implement clean energy projects while promoting U.S. private sector participation in sub-Saharan Africa's economic development.



U.S. - Africa Clean Energy Development and Finance Center

Only 26% of African households have access to electricity, yet Africa has abundant clean energy resources waiting to be developed.

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U.S. - Africa Clean Energy Development and Finance Center

U.S.-Africa Clean Energy Development Finance Center (CEDFC)

Energy access in African households is a major constraint to development, yet in Africa has abundant clean energy resources waiting to be harnessed. One of the main obstacles to accelerating clean energy investment in Africa is a lack of support to help cover the project development costs. Because of this gap, even those clean energy projects that have strong potential to deliver reliable energy to consumers and financial returns to investors often fail to clear the final hurdles for financing.

To address this gap in project development, CEDFC will provide U.S. private sector and sub-Saharan African developers with a centralized means to identify and access U.S. government support for their clean energy export and investment needs. Housed in the U.S. Consulate General in Johannesburg, South Africa, the Center will coordinate its resources with those of the U.S. private sector, multilateral development banks, local development banks, private banks, and private equity firms.

The Center will provide technical and financial support for clean energy project development in solar, wind, biomass, geothermal, hydropower, ocean power, alternative fuels, natural gas, cogeneration, distributed generation, energy efficiency and smart grid development.

U.S.-Africa Clean Energy Finance Initiative (US-ACEF)

CEDFC further advances objectives of the **U.S.-Africa Clean Energy Finance Initiative (US-ACEF)**, an innovative financing mechanism developed by the U.S. State Department, the Overseas Private Investment Corporation (OPIC), and the U.S. Trade and Development Agency (USTDA). Financed by $20 million in State Department funding, US-ACEF aims to catalyze private-sector clean energy deals in OPIC's existing and future pipeline. The initiative aims to align USTDA's project planning expertise and OPIC's financing and risk mitigation tools in new ways, to support private sector investment and increase support for U.S. businesses and exports in sub-Saharan Africa's clean energy sector.

Contact us for more information!

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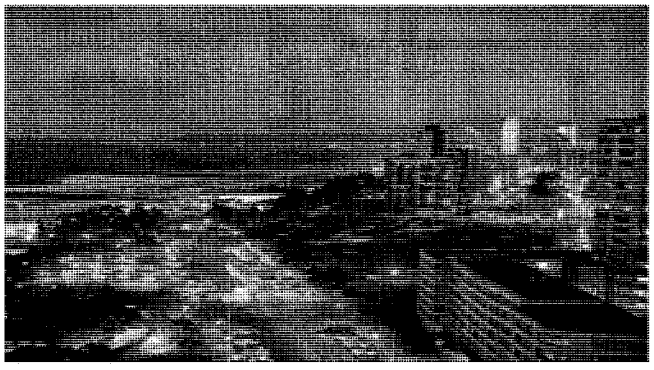
Through feasibility studies, technical assistance, pilot projects and other forms of project planning assistance, USTDA's Project Development Program helps overseas project sponsors identify technological solutions and sources of financing for priority infrastructure projects.

USTDA in South Africa

South Africa is a priority country for USTDA. The Agency has a local presence through its Africa Business Development Office, located in the U.S. Consulate General in Johannesburg. Responding to the needs of our local partners, as well as the U.S. business community, USTDA has prioritized investments in the clean energy, transportation and telecommunications sectors in South Africa.

Given South Africa's role as a regional leader and as a gateway to the rest of the African continent, USTDA has also prioritized investments in South Africa that support regional integration to help create larger markets, improve economies of scale, and reduce transaction costs associated with cross-border trade.



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Clean Energy

Recognizing the vital role that access to reliable and affordable electricity plays in sustainable economic growth, USTDA has prioritized investments in South Africa's clean energy sector. These investments have supported projects that are helping South Africa to mitigate current electricity shortages and prepare for long-term economic growth. Specifically USTDA is supporting power generation using clean energy sources, encouraging the modernization of electricity transmission and distribution infrastructure, and promoting energy efficiency and demand-side management programs.

Transportation

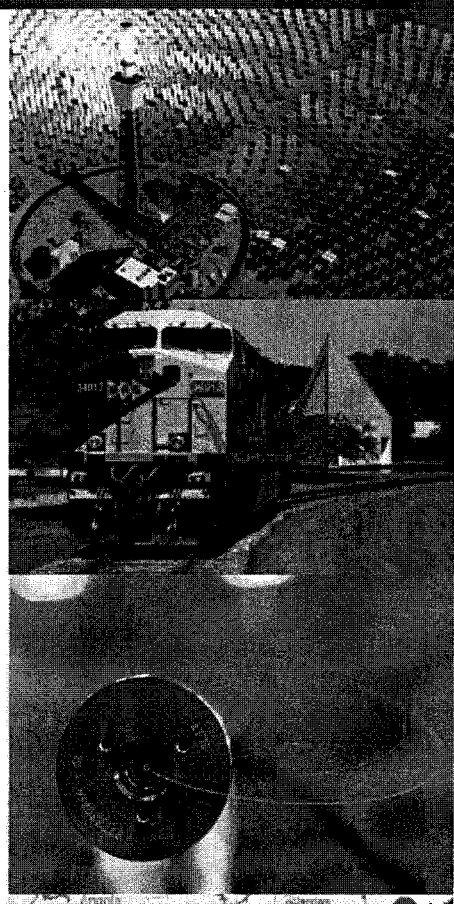
The modernization of South Africa's transportation infrastructure is contributing to increased trade and investment by reducing costs, improving efficiency, facilitating the shipment of goods, and promoting the free movement of people. In the aviation sector, USTDA is supporting the growth of safe, reliable aviation services through the development of critical human capacity resources and closer professional and commercial partnerships between the U.S. and South African aviation sectors. In the rail sector, USTDA is supporting the development of rail linkages and introducing stakeholders from South Africa's rail sector to innovative locomotive, signaling, and other rail technologies and services.

Telecommunications

Investments in telecommunication infrastructure throughout sub-Saharan Africa are contributing to dynamic growth across multiple sectors. In particular, undersea fiber optic cables, such as SEACOM, are drastically increasing connectivity and reducing prices for telecommunication services. To support access to reliable, affordable telecommunication services in South Africa, USTDA is cooperating with the City of Cape Town to assess options for expanding internet services in Khayelitsha and Mitchells Plain. By extending Cape Town's fiber optic network and providing advanced network services to Khayelitsha and Mitchells Plain, citizens will have increased access to affordable, reliable telecommunications. When implemented, the new network will connect Khayelitsha and Mitchells Plain to Cape Town's existing fiber optic network, the first phase of which was completed in March 2012.

Regional Integration

In addition to the key economic sectors outlined above, USTDA investments in South Africa also prioritize activities that support regional integration. These activities help to create larger markets, improve economies of scale, and reduce transaction costs associated with cross-border trade.



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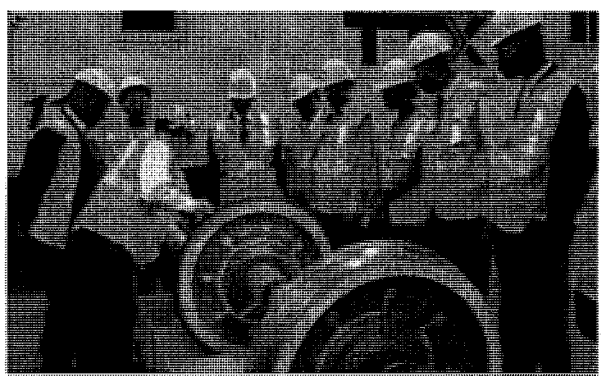
USTDA in Sub-Saharan Africa

USTDA places a high priority on sub-Saharan Africa, working with qualified project sponsors to facilitate the implementation of their priority infrastructure and development projects. In fact, one of the Agency's first grants was signed in Tanzania in 1981.

USTDA focuses its activities in strategic sectors that offer the greatest opportunity for developmental and commercial impact. These strategic sectors include clean energy, transportation, and telecommunications. Other sectors of interest include agribusiness and water.

The following page provides a representative sample of USTDA initiatives and activities in the region.



A delegation of East African transport officials views U.S. equipment that would aid the rehabilitation of critical railways and assist in upgrading freight cars

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Clean Energy

U.S.-Africa Clean Energy Development and Finance Center (CEDFC) - CEDFC, an initiative by USTDA, the Overseas Private Investment Corporation (OPIC) and the Export-Import Bank of the United States (Ex-Im Bank), provides a coordinated approach to developing and financing clean energy projects in sub-Saharan Africa.

Electricity Company of Ghana (ECG) Smart Grid Applications Feasibility Study (FS) - The FS for ECG is evaluating the critical aspects of a smart grid applications project in southern Ghana, providing recommendations for a system that will address business process planning and decision making, while helping to bring sustainability to ECG's infrastructure.

Aviation

South Africa Aviation Initiative - This Initiative supports the growth of safe, reliable aviation services in South Africa through the development of critical human capacity resources and closer professional and commercial partnerships between the U.S. and South African aviation sectors. Under the Initiative, USTDA is funding a series of U.S. study tours, training programs, and project planning activities for key stakeholders from South Africa's aviation sector in partnership with the U.S. private sector.

Rail

Southern Africa Regional Rail Initiative – Through this initiative, USTDA is supporting the development of rail linkages and regional integration in Southern Africa. The initiative commenced with a technical workshop in Johannesburg. Subsequent activities will include study tours to familiarize regional stakeholders with innovative locomotive, signaling, and other rail sector technologies and services.

U.S. East Africa Railway Modernization Study Tour - The USTDA sponsored study tour allowed delegates from the Rift Valley Railways and the Government of Uganda to discuss industry best practices with U.S. rail sector experts and explore financing options with Ex-Im Bank and OPIC for priority projects in the sector.

Telecommunications

Khayelitsha and Mitchells Plain Digital Inclusion - USTDA has partnered with the City of Cape Town to assess options for expanding internet services in Khayelitsha and Mitchells Plain. When implemented, the new network will connect Khayelitsha and Mitchells Plain to Cape Town's existing fiber optic network and increase access to affordable, reliable telecommunications.

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Contact us for more information:

Paul Marin- Regional Director for sub-Saharan Africa
Michael DeRenzo- Country Manager
Lisa Bonnikson- Country Manager
Brandon Megorden- Country Manager
Blair Mersinger- Special Projects Manager
Chris Giglio- Project Analyst Contractor
Meredith Schuessler- Project Analyst Contractor
Jason Nagy- Africa Business Development Manager (Johannesburg)

Africa@ustda.gov
(703) 875-4357
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FINAL AGENDA

All sessions take place in conference rooms Nina I & II on the conference room level.

DAY 1 – May 21, 2013

0800 – 0900 **REGISTRATION AND CONTINENTAL BREAKFAST**
Sponsor Expo and Breakfast in Ilanga I & II on the conference room level

0900 – 0945 **WELCOME AND OPENING REMARKS**

- Paul A. Marin, Regional Director, U.S. Trade and Development Agency
- Catherine Hill-Herndon, Acting Deputy Chief of Mission, U.S. Embassy
- Prof. Mosad Elmissiry, Head Energy Programmes, NEPAD Planning and Coordinating Agency

0945 – 1100 **MARKET REVIEW & UPDATE:**
Independent Power Producers in Southern Africa's Solar Sector

This session is an opportunity for Southern African stakeholders to provide a review and update of the current independent power producer landscape and opportunities for solar energy power purchase agreements in their countries. This session will also address South Africa's 2010 Integrated Resource Plan and how solar fits in.

Moderator: Paul A. Marin, Regional Director, U.S. Trade and Development Agency

- Ayanda Nakedi, Senior General Manager, Renewables Business Unit, Eskom
- Kumesh Naidoo, Programme Manager: Solar Park Feasibility Study, Central Energy Fund (SOC) Ltd.
- Margaret Mutschler, Head of Projects, Namibia Power Corporation (NamPower)
- Alban Motsepe, Director of Corporate Services, Botswana Power Corporation

1100 – 1130 **NETWORKING BREAK** *in Ilanga I & II*
Sponsored by BrightSource Limitless

1130 – 1230 ISSUES & OPPORTUNITIES: REIPP UPDATE

This session will entail an in-depth update on South Africa's Renewable Energy Independent Power Producer Procurement Program, status of current bid round and discussion of lessons learned from previous rounds.

Moderator: Jason Nagy, African Business Development Manager, U.S. Trade and Development Agency

- Yousuf Haffejee, Head : Single Buyer Office, Eskom
- Jasandra Nyker, Chief Executive Officer, BioTherm Energy

1230 – 1400 LUNCHEON *in the Jabulani Restaurant on the lobby level*

1400 – 1515 SOLAR PROJECT DEVELOPMENT: PRIVATE SECTOR LESSONS LEARNED

This session will address preparatory steps taken to successfully implement large-scale power deployment in Southern Africa. Industry case studies will address the challenges and lessons learned in solar project development.

Moderator/Presenter: Dr. Terry Peterson, Solar Power Consulting

- Greg Retzlaff, Manager of Renewable Energy Technical Services – Africa, Black & Veatch International
- Vignesh Nandakumar, Country Manager, South Africa operations, SunEdison
- Terence Govender, Director Development, Solar Reserve South Africa
- Cobs Pillay, Deputy Director: Green Economy, South African Department of Trade and Industry

1515 – 1615 SOLAR PROJECT PLANNING AND FINANCE

This panel will review the financing resources and case studies for financing solar projects in Southern Africa. Panelists will be representatives from U.S. government international funding organizations and private funding organizations. Topics will include an overview of the **U.S.-Africa Clean Energy Development and Finance Center (CEDFC)**, additional government resources and case studies on financing solar power projects.

Moderator: Jason Nagy, African Business Development Manager, U.S. Trade and Development Agency

- Peter Ballinger, Managing Director and Resident Representative, Africa, Middle East, Indian Ocean Region, Overseas Private Investment Corporation
- Lucy Chege, General Manager: Infrastructure Finance - Energy, Environment & PPPs, Development Bank of Southern Africa Limited
- Rentia van Tonder, Head: Green Industries SBU, Industrial Development Corporation

1615 – 1630 NETWORKING BREAK *in the Ballroom on the lobby level*

1630 – 1830 **ONE-ON-ONE MEETING SESSION** *in the Ballroom on the lobby level*

This session is an opportunity for U.S. companies to schedule twenty minute private meetings with the attending Southern African delegates. A list of delegates available for meetings will be circulated prior to the event for U.S. companies to select their meeting preferences. Meetings are scheduled on a first come, first served basis.

1730 – 2000 **WELCOME RECEPTION** *in the Ballroom on the lobby level*

Sponsored by

HARPER
CONSTRUCTION COMPANY, INC

DAY 2– May 22, 2013

0830 – 0900 **CONTINENTAL BREAKFAST**
in Ilanga I & II on the conference room level

0900 – 1030 **SOLAR POWER TECHNOLOGIES: LATEST INNOVATIONS**

This workshop session will provide an overview of PV and CSP systems, reviewing relative advantages and challenges, latest innovations and outlooks for future applications and technologies.

Moderator/Presenter: Dr. Terry Peterson, Solar Power Consulting

- Dr. Gregory M. Wilson, Director, National Center for Photovoltaics (NCPV), U.S. Department of Energy's (DOE), National Renewable Energy Laboratory (NREL)
- Daniel Schwab, Consultant, BrightSource Energy, Inc.
- Paula Owen, Business Development, SunPower
- Siddhartha Ghoshal, Business Development Director, Indian and Southern Africa Region , Areva Solar

1030 – 1100 **NETWORKING BREAK** *in Ilanga I & II sponsored by*

AREVA
forward-looking energy

1100 – 1200 **INTEGRATION WITH THE POWER GRID**

This workshop session will address issues related to integrating solar and renewable energy sources to the existing power grid. Developing a smart grid system and addressing connectivity issues is critical to further development of the renewable energy industry and expansion of solar power in South Africa.

Moderator: Dr. Terry Peterson, Solar Power Consulting

- Leslie Naido, Infrastructure Investment Planning Manager
  Grid Planning, Eskom Transmission
- Dr. Gregory M. Wilson, Director, National Center for Photovoltaics (NCPV), U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL)
- Nape Maepa, Engineering Advisor, ElectronVault

1200 – 1230 REGIONAL REGULATORY AND MARKET FRAMEWORKS IN SOUTHERN AFRICA

This panel session would provide an overview of the current regulatory frameworks in Southern Africa.

Moderator: Brandon Megorden, Country Manager, Sub-Saharan Africa, U.S. Trade and Development Agency

- Mike Goldblatt, Deputy Chairman, Southern Africa Solar Thermal and Electricity Association
- Ronald Chauke, Head of Department: Regulatory Reform, National Energy Regulator of South Africa (NERSA)

1230 – 1345 LUNCHEON *in the Jabulani Restaurant on the lobby level*

1345 – 1500 PROVINCIAL & MUNICIPAL EXPERIENCE WITH SOLAR PUBLIC POLICIES

This workshop session will review current issues and case studies regarding solar power development at the provincial and municipal levels. Current projects, priorities and challenges for provincial/municipal entities will be discussed. Possible Topics: Rationale, cash subsidies, tax incentives, power-purchase agreements, renewable energy credits, recommendations and next steps.

Moderator: Jason Nagy, African Business Development Manager, U.S. Trade and Development Agency

- Michael E. Firenze, MAS, LEED AP, Senior Project Manager, Energy Programs' Chief Strategist, Harper Construction Company, Inc.
- Piet Papier, Mayor, Siyathemba Municipality
- Gavin Kode, Department of Transport and Public Works: Public Works Branch, Western Cape Provincial Government
- Nepo Kekana, Acting Executive PIPFU, Limpopo Economic Development Agency
- Dr. Emmanuel Maepa, Senior Manager Renewable, Ekurhuleni Metropolitan Municipality

1500 – 1530 NETWORKING BREAK *in Ilanga I & II*

1530 – 1600 SOLAR POWER SOLUTIONS FOR INDUSTRY & MINING

This workshop session will explore topics on inside-the-fence solar applications for mining and industry sectors.

Moderator: Brandon Megorden, Country Manager, U.S. Trade and Development Agency

- Mikael M. Hajjar, Business Development Manager, AREVA Solar, AREVA South Africa

1600 – 1630 WORKSHOP WRAP-UP AND DISCUSSION

Moderator: Paul A. Marin, Regional Director, U.S. Trade and Development Agency

USTDA will lead this panel and panelists will be selected from the workshop participants. The discussion will review the key themes, topics and relevant next steps to U.S. and Southern African partnerships in the development of solar energy in Southern Africa.

1630 – 1700 CLOSING

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TABLE OF CONTENTS

- CEF Group of Companies
- Introduction
- Feasibility Study
- Procurement
- Progress to Date
- Questions

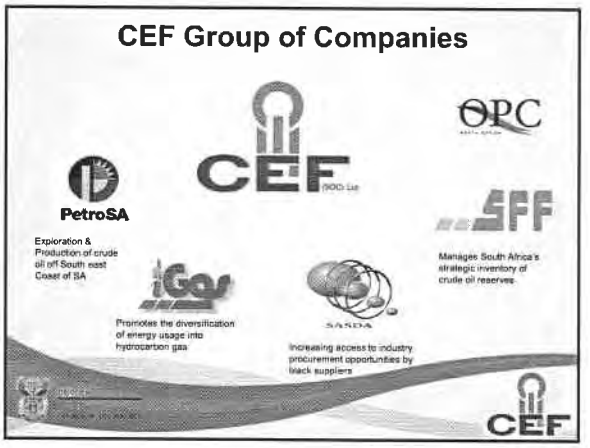
CEF Group of Companies
Who is CEF?

- CEF (SOC) Ltd is a 100% State Owned Company; and reports to the Minister of Energy, (Department of Energy) and controlled by a Board appointed by the Minister.
- CEF is involved in the search for appropriate energy solutions to meet the future energy needs of South Africa, the Southern African Development Community and the sub-Saharan African region including:
  - Oil, gas, electrical power, solar energy, low-smoke fuels, biomass, wind and alternative energy sources.
- CEF also manages the operation and development of the oil and gas assets and operations of the South African government.

CEF Group of Companies
Who are CEF's subsidiaries?

- The CEF group operates in the energy sector and controls entities with commercial, strategic, regulatory and developmental roles.
- The CEF group consists of the following operating subsidiaries :
  - PetroSA
  - iGas
  - OPSCA
  - SASDA and
  - The Strategic Fuel Fund (SFF)
- CEF includes the Clean Energy Division (CED), a division of CEF operational for the last 9 years; through which its Renewable and Alternative energy resources interests is being explored and developed

CEF Group of Companies



Introduction

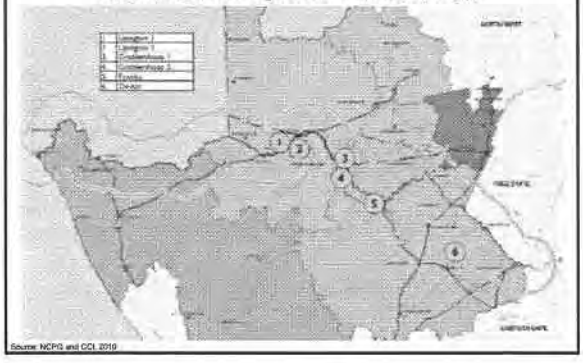
- DOE Minister invited CEF to lead SA Government efforts in conducting the Solar Park Feasibility Study and then presenting the results to Government and engaging all interested stakeholders in this area
- Upington Site was initially identified for the study, however access to municipal land posed a major challenge
- The DoE identified new site within the Siyathemba Municipality, near Prieska for the Solar Park Feasibility
- Upington site will be included into existing study

The Concept of a Solar Park

- One or more pieces of land in close proximity are designated and pre-permitted as a Solar Park
- Individual solar plants developed by multiple power producers are constructed on the land in a clustered fashion and on a predictable timeline, sharing common transmission and infrastructure
- Contain plants with several different solar thermal and photovoltaic technologies
- Would decrease the cost of solar power significantly due to economies of scale
- Would also reduce project development costs

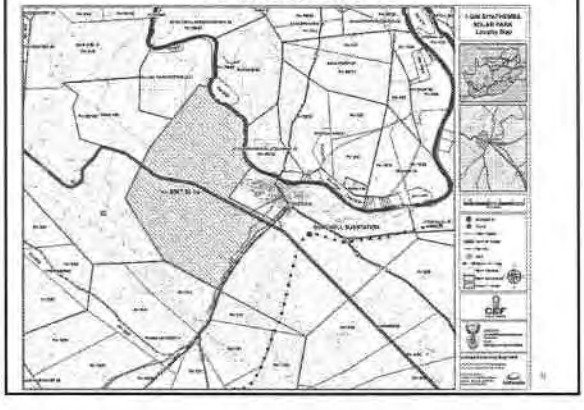
The Northern Cape Solar Corridor

Potential Solar Park target areas in the Northern Cape



Source: NCPG and CCL 2010

Prieska Site



Project Timelines

Scope of the Feasibility Study

- The objective is to complete a study that is credible to the global solar industry and meets all Cabinet's criteria for approval of the concept if it is viable
- To evaluate the impact of the 5 GW Solar Corridor programme on South Africa
- To produce a preliminary design for a 1GW Solar Park at Siyathemba Municipality
- To assess the potential for development of significant solar electricity generation in SA at costs comparable to coal derived power
- To identify opportunities for localisation of solar technologies enabled by the scale of the proposed development
- To assess the impact of economic development for Siyathemba Municipality and the Northern Cape

Scope of the Feasibility Study cont.

The Scope of Work details 11 areas:

1. Framework for Solar Park Development
2. Solar Electricity Generation
3. Technical Economic Evaluation
4. Financial Framework
5. Industrial Development & Localisation
6. Socio-Economic Benefits
7. Benefits to Investors
8. Development of 5GW Solar Corridor
9. Market Review of Potential Competitive Sites
10. Lessons Learnt
11. Coordination with other Solar Projects

Procurement of Professional Services

- Open tender published in Sunday Times October 2012 for:
  - Appointment of Feasibility Study Consultant
  - Appointment of EIA Consultant
  - Appointment of Geotechnical Consultant
- Tender evaluations during month of Nov/Dec 2012
- EIA contracts finalised with LIDWALA and signed off end Feb 2013
- Geotechnical contract finalised with Jeffares & Green and signed off end Feb 2013

Progress to Date – EIA Study

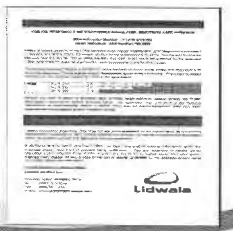
- EIA work commenced March 2013
- Authorisation is required from in terms of the National Environmental Management Act
- Competent authority - National Department of Environmental Affairs (DEA)
- Commenting authority - Northern Cape Department of Environment and Nature Conservation (NDENC)
- Other Applications: Integrated Water Use Licence Application (IWULA)

Progress to Date – EIA Study

- EIA work commenced end Feb 2013
- Authorisation is required from in terms of the National Environmental Management Act
- Competent authority - National Department of Environmental Affairs (DEA)
- Commenting authority - Northern Cape Department of Environment and Nature Conservation (NDENC)
- Independent environmental studies in accordance with the EIA Regulations of June 2010
- Other Applications: Integrated Water Use Licence Application (IWULA)

Progress to Date – EIA Study cont.

- Application submitted to DEA - acknowledgement by DEA
- Initial notification process
- Specialist study



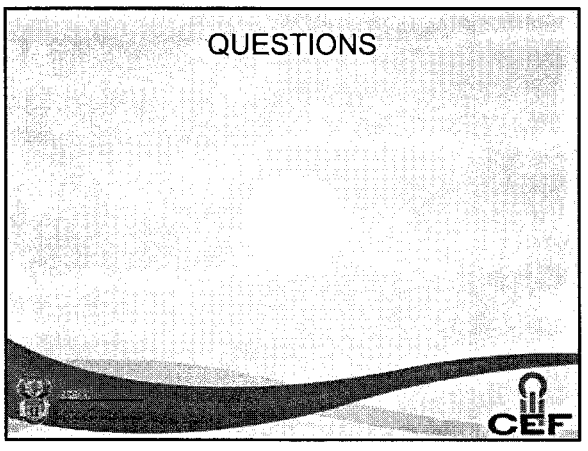
Progress to Date - Geotechnical

Scope of work comprised the procurement of all geotechnical and geological information required for the preliminary stage and construction planning for the solar park (listed below but not limited to):

- Determine depth to bedrock and its properties
- Determine soils characteristics across the site
- Determine the surface and groundwater regimes
- Advise on typical foundation solutions
- Locate, test and quantify suitable local materials for earthworks

Project Timelines

ACTIVITIES	TARGET DATES
Feasibility Study	Mid May 2013 – December 2013
Submission to DoE	Jan 2014
Prieska EIA	March 2013 – August 2014
Prieska Geotech Study	February 2013 – May 2013


QUESTIONS
CEF

BUILDING A WORLD OF DIFFERENCE

21-22 May 2013

PROJECT IMPLEMENTATION SUCCESS ELEMENTS

USTDA WORKSHOP

GREG RETZLAFF MANAGER OF RENEWABLE ENERGY TECHNICAL SERVICES – AFRICA REGION

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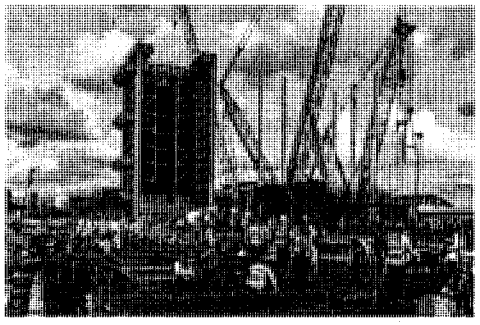
TOPICS

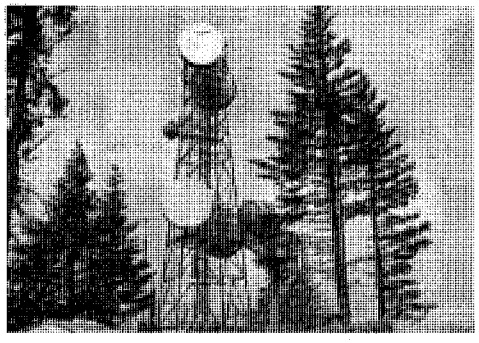
Introduction to Black & Veatch
Qualified Workforce
Local Goods & Services
Scheduling Principals
Case Study – Cost Control

INTRODUCTION TO BLACK & VEATCH



Power

Water



Telecommunication

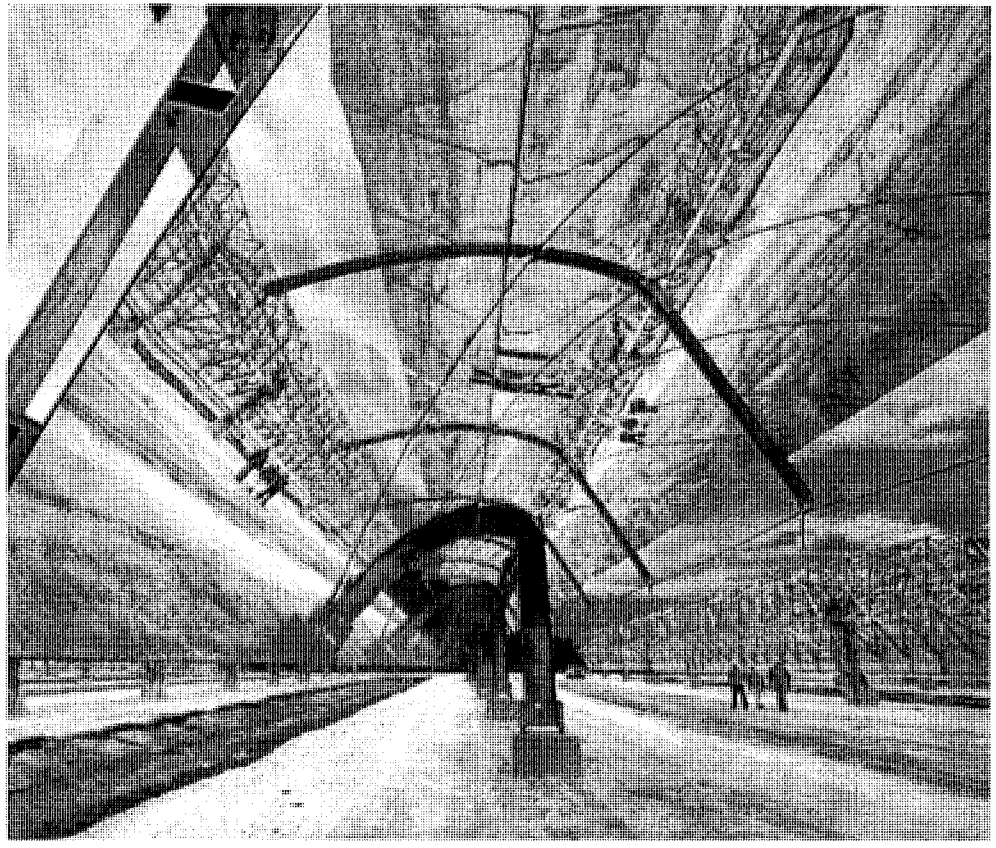
WE'RE BUILDING A WORLD OF DIFFERENCE. TOGETHER.

- Engineering, consulting & construction
- Founded in 1915
- Global workforce of more than 10,000
- Employee-owned corporation
- $3.3 billion in annual revenues in 2012
- 100+ offices worldwide
- Completed projects in more than 100 countries
- ENR rated B&V 2nd of top 50 in Power

QUALIFIED WORKFORCE

QUALIFIED WORKFORCE CHALLENGES

- Rising Experience
- Growing Workforce
- Quality Challenges
- Safety



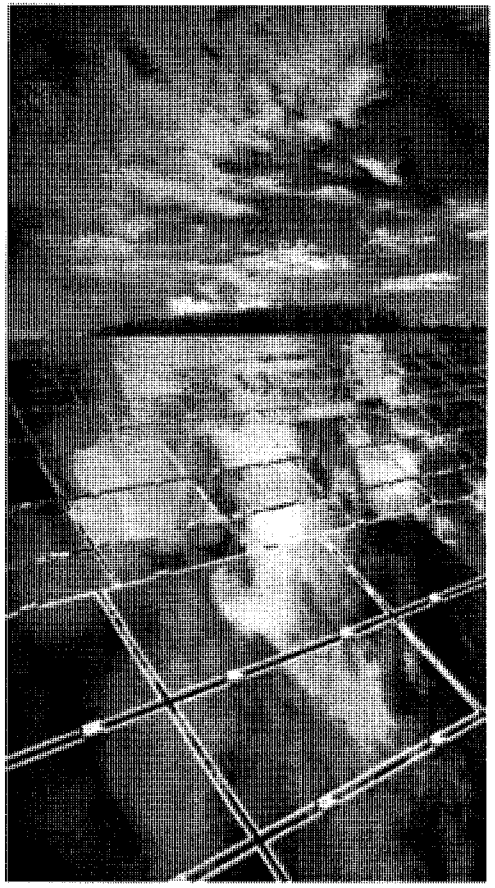
QUALIFIED WORKFORCE CHALLENGES - MITIGATION

Rising Experience Levels

- Training prior to start of construction
- Knowledge transfer
- Special on-shore training sessions

Growing Workforce

- Pre-construction assessment
- Pre-construction recruitment



QUALIFIED WORKFORCE CHALLENGES - MITIGATION

Quality Challenges

- Greater attention to detailed specifications
- Presentation of industry standards
- Adequate construction monitoring & management

QUALIFIED WORKFORCE CHALLENGES MITIGATION

Safety Risks

- **Unfamiliar equipment means new safety risks**
  - Wires are hot if panels exposed to sunlight
  - Electrical fire hazard
- **Mandatory safety training for all staff**
  - Everyone is responsible for onsite safety
- **Select crew members to monitor safety**

Establish a culture of safety

LOCALLY AVAILABLE GOODS & SERVICES

LOCALLY AVAILABLE GOODS & SERVICES

- **Local market knowledge is essential**
  - Case Study
- **Plan for what cannot be locally sourced**
- **Customs navigation**
  - Foreign equipment and tools
  - Local knowledgeable customs specialists
- **Locally available services**
  - Shipping methods are critical
  - Logistics

SCHEDULING PRINCIPALS

SCHEDULING PRINCIPALS

Rules of Thumb

- Good schedules built with process knowledge
- Interface milestones, link various contractors' work
- Integration of the whole contractors plan not always advised
- Generally there is at least one logic tie for every activity

Activity ID	Orig Dur	Total Float	%	Early Start	Early Finish
Primary Driving Path to Completion					
664089	10	-184	0	16FEB07*	26FEB07
744059	2	-184	0	01MAR07	02MAR07
744066	5	-185	0	01MAR07	07MAR07
744061	2	-184	0	02MAR07	04MAR07
744063	2	-184	0	04MAR07	05MAR07
744068	2	-220	0	05MAR07	06MAR07
744093	0	-184	0		07MAR07
749000	12	-184	0	08MAR07	21MAR07
755000	0	-184	0	14MAR07	
760000	26	-184	0	14MAR07	12APR07
765000	0	-184	0		12APR07
664122	24	0	0	13APR07	10MAY07
717550	1	153	0	13APR07	13APR07

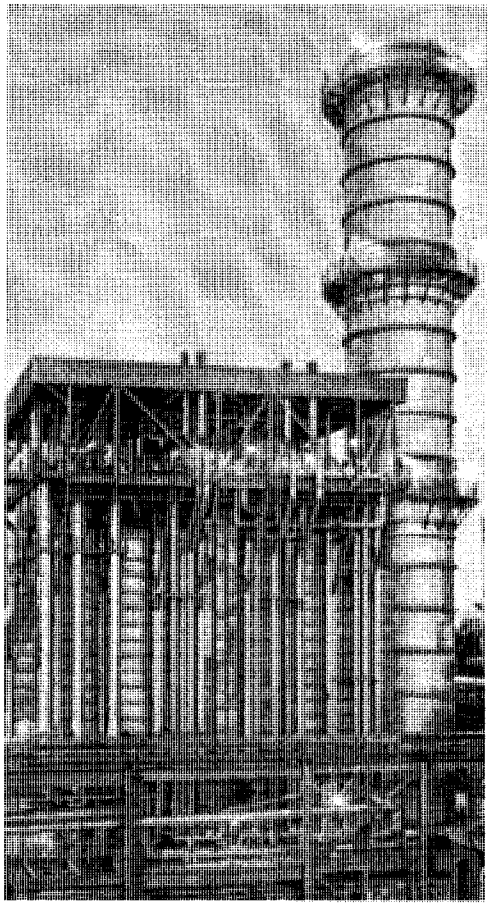
SCHEDULING PRINCIPALS (Cont.)

Rules of Thumb

- Project status & health reports are required from scheduling and project controls
- Changes to programme must be quickly communicated
- Activity durations should be limited to about 20 days

Suitable project controls are critical to success

CASE STUDY
COST CONTROL

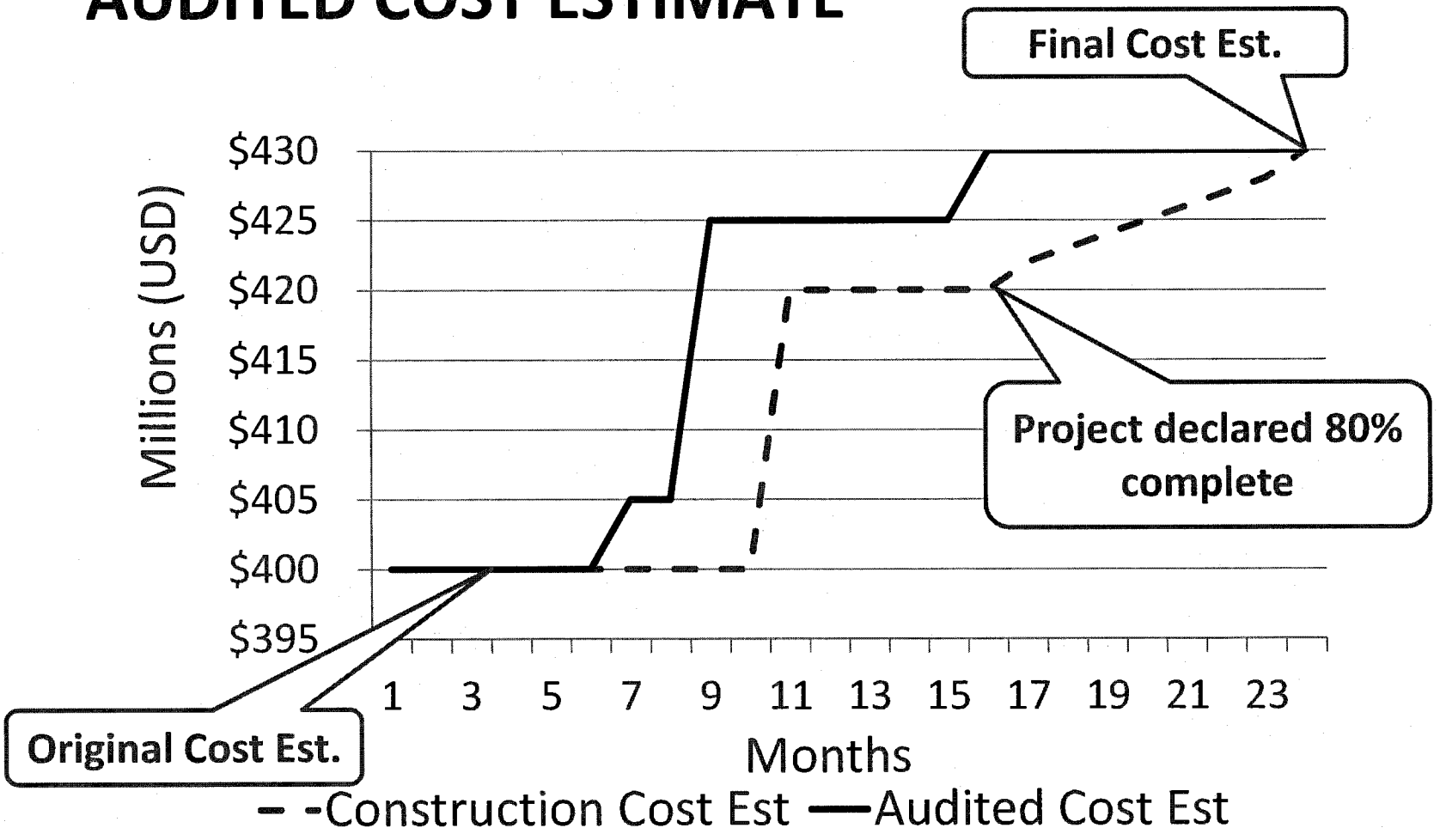


CASE STUDY – COST CONTROL

The Scenario

- **Power plant project execution**
- **EPC, fixed price**
- **Construction partner inexperienced - simplistic methods of forecasting construction:**
  - Straight – line forecasting
  - Manual override of straight line
- **No review of past performance or estimate of future performance**

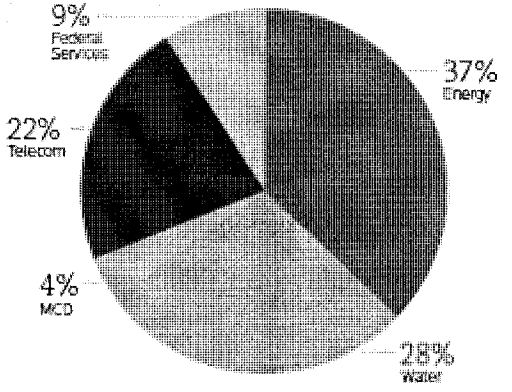
CONSTRUCTION COST ESTIMATE VS. AUDITED COST ESTIMATE



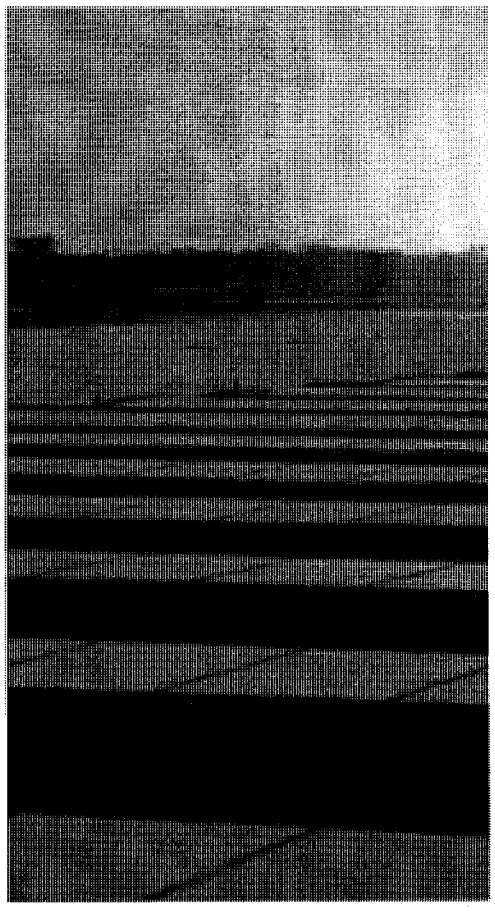
More accurate predictability with experienced Project Controls staff

CASE STUDY – COST CONTROL SUMMARY

- Avoid the "Superman Syndrome"
- Do not rely on a single method to forecast
- Apply conscious thought to what forecast to use
- Review forecast assumptions and ranges
- Understand that indices are less reliable in the early stages and late stages of a project



Historical trends are difficult to overcome



CONCLUSION

- **Utilize training & knowledge transfer**
- **Assess labour resources early**
  - Reassess periodically and adjust accordingly
- **Review local services available**
- **Utilize quality scheduling and cost control resources.**
- **Provide project float and contingency**
- **Make safety training a high priority**

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PAUL MARIN

Paul Marin serves as the Regional Director for Sub-Saharan Africa at the U.S. Trade and Development Agency (USTDA), where he is responsible for developing the agency's strategies and assistance activities throughout the region.

Previously, Mr. Marin served as USTDA's Assistant Director for Policy and Program, a role in which he advised program staff on the formulation of foreign assistance activities and worked to improve program-related operational efficiency and product quality.

In his career at USTDA, Mr. Marin served briefly as the Acting Regional Director for Latin America and the Caribbean and was responsible for managing the agency's Southeast Asia and Southeast Europe portfolios. Prior to joining USTDA in 1998, he contributed to the development of U.S. commercial policy in the Balkans while working in the Market Access and Compliance division of the Commerce Department's International Trade Administration.

Mr. Marin's 15-year career in international trade and development started soon after earning his Bachelor's degree from Bucknell University and his Master's degree from the Johns Hopkins School of Advanced International Studies.

JASON NAGY

Jason Nagy is the Africa Business Development Manager, based in Johannesburg, South Africa, for the U.S. Trade and Development (USTDA). Prior to this, Mr. Nagy served as USTDA Country Manager for South Asia and as a Project Analyst, Contractor for USTDA's Sub-Saharan Africa regional program.

Prior to USTDA, he served as Program Specialist for the Member of the Board of Directors at the Export-Import Bank of the United States responsible for the Bank's sub-Saharan Africa business development efforts.

Mr. Nagy has a master's degree in international affairs from American University with concentrations in international economic policy and international business. His bachelor's degree is in political science and journalism from Indiana University.

Officials, Speakers and Moderators

Mr. Peter Ballinger
Managing Director and Resident Representative, Africa, Middle East, Indian Ocean Region, Overseas Private Investment Corporation

Peter Ballinger of the Overseas Private Investment Corporation (OPIC) is Managing Director and Resident Representative, Africa, Middle East, Indian Ocean Region, based in Johannesburg, South Africa. Prior to this he was the OPIC Director of the joint USTDA-Ex-Im Bank-OPIC Clean Energy Finance Center in New Delhi, India.

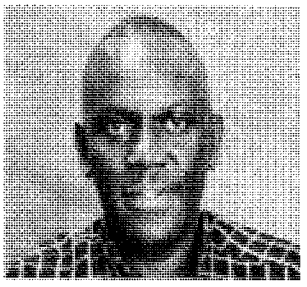
Mr. Ballinger joined OPIC in 1986 in a position promoting U.S. investment in the Middle East/Africa region. Since 1989, Mr. Ballinger has concentrated much of his efforts at OPIC on developing new finance and insurance projects in the Europe/Eurasia region. This included a five-year assignment as the OPIC Director at the Caspian Finance Center, a joint regional office of OPIC, the Export-Import Bank of the United States and the U.S. Trade and Development agency based in Turkey. From this regional office, OPIC completed the first small business projects in countries such as Armenia, Georgia, Azerbaijan, Afghanistan, Uzbekistan and Turkey.

From 1992-1995, Mr. Ballinger was the Director of Marketing; prior to this, Mr. Ballinger managed investment development and outreach activities in the Asia, Africa and Latin American region. He also managed two successful USAID-funded investment promotion projects for the Latin America (1990-1992) and Africa (1990-1994) regions and oversaw the establishment of OPIC's first overseas office, in Moscow, Russia, in 1992.

Before joining OPIC, Mr. Ballinger worked for several years at the Washington International Center of Meridian International in a variety of international economic program positions. Prior to this, he owned and operated a sports-related travel company with operations in the eastern United States and Western Europe. He has lived and worked in some 10 countries, including Turkey, the Philippines, Taiwan, Switzerland, Germany, Panama, South Africa and the United Arab Emirates.

Mr. Ballinger received his M.S. in International Business from Johns Hopkins University and a B.S. in International Relations from the American University.

Ms. Lucy Chege
General Manager: Infrastructure Finance – Energy, Environment & Public Private Partnerships
Development Bank of Southern Africa



Mr. Ronald Chauke
Head of Department: Electricity Regulatory Reform
National Energy Regulator of South Africa (NERSA)

As Head of Department for Electricity Regulatory Reform, Ronald Chauke is responsible for the Administration and Management of Transmission and Distribution Grid Codes, review and evaluation of Eskom's annual Transmission Planning Strategy, developing and reviewing regulatory frameworks and align them with latest developments in the overall electricity industry from both supply and demand perspectives by also factoring the legislative implications; and providing strategic support to the tariff methodology development. He also is active in engaging policy makers and other key players in government to influence the policy direction in the energy sector and in providing strategic and technical advice to the board of directors of the energy regulator. Mr. Chauke has represented NERSA at regional forums (such as the Southern African Power Pool, African Forum of Utility Regulators, Regional Energy Regulators Association and continues to advise the Ministry of Finance on the fossil fuel subsidies and price volatility at the G-20 conventions. Prior to his current role at NERSA, Mr. Chauke served as Director: Public Finance within the South African National Treasury, focusing on providing strategic support to the National Departments of Communications and Energy in preparing budgets and budget documentation.

Mr. Michael Firenze
Senior Project Manager and Chief Strategist, Energy Programs
Harper Construction Company

Michael Firenze, LEED AP; MAS AESE; is Senior Project Manager, Energy Programs' Chief Strategist at Harper Construction Company. He has over twelve years of design-build project management experience on a wide array of project types, most notably in advanced renewable systems and energy infrastructures. Mike has been instrumental in developing Harper Construction's company-wide energy initiatives and has taken the lead on the development and integration of numerous new technologies with the United States Department of Defense (DoD) to include the first DoD Concentrating Photovoltaic (CPV) field, traditional photovoltaic and geothermal systems, fuel cells, hydrogen generation and distribution, micro hydro, hybrid vehicle refueling, energy storage, autonomous distributed generation, building efficiency and automation, and microgrid technologies. He has developed various innovative renewable energy and energy security products currently in use within U.S. military installations and acts as principle investigator on various energy security research and development projects for the U.S. Navy. Mike recently obtained a Master's Degree in Architecture-based Enterprise Systems Engineering from the Jacob's School of Engineering at the University of California San Diego and, combined with his undergraduate degree in Economics looks to bring sustainable economic development through the integration of clean energy systems, large and small.

Mr. Siddhartha Ghoshal
Business Development Manager (India and South Africa)
AREVA Solar India Pvt. Ltd.

Mr .Mike Goldblatt
Deputy Chairman
Southern Africa Solar Thermal and Electricity Association

Mr. Terence Govender
Director: Development Southern Africa
SolarReserve

Mr. Yousuf Haffejee
Market Development Manager, Single Buyer Office
Eskom

Mr. Mikael Hajjar
Business Development Manager, AREVA Solar
AREVA South Africa

Ms. Helvi Ileka
Energy Shop Project Officer (Acting Coordinator)
Renewable Energy and Energy Efficiency Institute (REEEI) – Namibia

Ms. Helvi Ileka serves as Energy Shop Project Coordinator (ESCA), under the Off-Grid Energisation Master Plan at the Renewable Energy and Energy Efficiency Institute-REEEI at the Polytechnic of Namibia. In November 2012 she was appointed as Acting Coordinator of the Institute. The Renewable Energy & Energy Efficiency Institute (REEEI) is a national energy institute at the Polytechnic of Namibia. It was established in 2006 through a cooperation agreement between the Ministry of Mines and Energy (MME) and the Polytechnic of Namibia. The Institute is funded by the Ministry of Mines & Energy (MME). In 2012, the Cabinet approved the transformation of the Renewable Energy and Energy Efficiency Institute (REEEI) at the Polytechnic of Namibia to Namibian Energy Institute (NEI) with a mandate to support the capacity building, research and development and technical advisory needs of the whole energy sector in Namibia.

Helvi's main functions at REEEI include coordinating with regional councils and recruiting existing businesses to become energy shops; and training, marketing, monitoring and management of the entire roll out of energy shops in line with Off-Grid Energisation Master Plan. She is the Technical Advisor in the implementation of the entire Off-Grid Energisation

Master Plan Activities such as Solar Revolving Fund and for the Public Institutions in the Off-Grid area to be installed with PV installations.

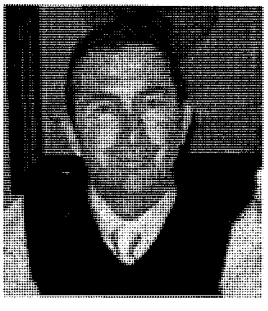
Mr. Nepo Kekana
Acting Executive PIPFU
Limpopo Economic Development Agency

Mr. Gavin Kode
Special Assistant to the Head: Provincial Public Works
Western Cape Government

Gavin Kode is a special projects adviser to Gary Fisher, the Executive Manager of the Public Works Branch of the Western Cape Government and, as such, is the designated project manager for the Western Cape Government's feasibility study for rooftop PV solar currently underway in terms of the USTDA's grant funding of infrastructure program. He also spearheads all Green Initiatives run within the Public Works Branch.

Gavin is a property professional by choice and a project director by preference after having gained diverse experience in the fields of financial services, property, construction, manufacturing, printing, aviation and law, tax and business consulting. He recently left Old Mutual Property where he managed a diverse portfolio of commercial properties. Following business and law undergraduate studies and being admitted as an Attorney of the High Court of South Africa in 1996, Gavin specialized in tax law and achieved a master degree in taxation from the University of the Witwatersrand. After leaving professional practice, he gained experience in asset based structured financing, corporate finance, mergers and acquisitions, project finance and private equity in the merchant and investment banking arena. Gavin then went back to university full time to pursue an MBA (Wits Business School) and was privileged during this time to be selected for an international exchange program where he completed part of the MBA at the Fuqua School of Business at Duke University in Durham, North Carolina.

Ms. Laura Luckhurst
Manager of Business Development, Sub-Saharan Africa
First Solar



Mr. Barry MacColl
General Manager
Research, Test and Development Group
Eskom

Barry MacColl serves as General Manager in the Research Test and Development Group in the Group Technology Division at Eskom. His role is to provide leadership to the 400 plus people involved in specialized research, testing and development activities at Eskom and ensure that applied

research results positively impact on Eskom's operations and long term sustainability. He has served at Eskom in various roles since 1993, including Technology Strategy and Planning Manager, Strategic Planning and Risk Distribution Manager and Electricity Delivery Manager.

Mr. MacColl attended Natal University in Durban, graduating with a BSc degree in Engineering Electronics. He completed postgraduate studies at Rhodes University in Grahamstown, completing a Masters in Business Administration.

Dr. Emmanuel Maepa
Senior Manager, Renewable and Alternative Energy
Erkhuleni Metropolitan Municipality

Mr. L.H. Nape Maepa
Engineering Advisor
ElectronVault

Nape Maepa is currently the Engineering Advisor to ElectronVault, Inc., a Silicon Valley, California provider of leading-edge, patented, energy storage systems for electric vehicles and intermittent electrical energy supply services with uses in renewable energy and unreliable energy utility supplies. ElectronVault patents cover over 300MWh of Lithium-Ion energy storage in operation in the demanding electric vehicle storage market worldwide, in all models of the Tesla, BMW Mini-E, and scooter models.

In South Africa, Nape was the Founding Chairman of Suncorp Manufacturing, the first solar panel assembly plant in South Africa, in Kew, Johannesburg. The company was sold following presidential appointment to set up as Founding Chairman the new FCC-equivalent ICT regulator for South Africa. Nape had an engineering career with Black & Veatch Engineers that spanned three decades, during which time he undertook a wide range of energy and infrastructure development projects worldwide that included solar, nuclear, coal, and gas projects. While at Black and Veatch, he was active in providing consulting, design engineering, and construction support services for the energy supply system of the Eastern Province of Saudi Arabia. The design included one of the first uses of a fibre-optic shield wire application on a transmission line for both communications and overhead line protection. He also supervised and managed the engineering design of numerous substations for the Electricity Generating Authority of Thailand (EGAT) as well as for the Arabian American Oil Company (ARAMCO) which resulted in the utility company SCECO, along with the Rehabilitation of the Alexandria, Egypt, Electricity Network and was Project Manager in behalf of the Funding Bank of the construction of the 20MW biomass powerplant in Imperial Valley, California.

Among Nape's significant ICT sector accomplishments include serving as the Founding Chairman the ICT Regulator for South Africa and championing the cause of regulatory reform and the liberalization of the ICT sector in both South Africa and the Southern African Development Community (SADC) region, managing the USTDA-funded project for a complete electromagnetic frequency band plan for South Africa between 20MHz and 3GHz and advising the Common Market for East and Southern Africa (COMESA) countries on ICT

regulatory reform and setting up the ARICEA group of national ICT regulators for the COMESA countries, under a USAID-funded Leland Initiative project of the US Agency for International Development.

Nape has a Bachelor of Science in Electrical Engineering form Purdue University and a Master of Science in Electrical Engineering from the University of Missouri. He is a Fellow of South African Academy of Engineering (FSAAE) and a Life Senior Member of the Institute of Electrical and Electronics Engineers (SMIEEE).

Mr. Nchena Mothebe
Acting Director, Transmission
Botswana Power Corporation

Nchena Mothebe is currently the Acting Director for Transmission of Botswana Power Corporation and responsible for, amongst others, sourcing and purchasing of electricity. Botswana Power Corporation is the national electricity company responsible for generation, transmission, distribution and supply of electricity. Mr. Mothebe joined Botswana Power Corporation in 1991 as a Graduate Engineer and has worked as an Engineer and Manager in Distribution and Transmission Departments.

Mr. Mothebe has a Bachelor of Engineering in Electrical and Electronics from Birla Institute of Technology; Mesra; Ranchi in India obtained in 1991. He is a Chartered Engineer and a Member of Institute of Engineering and Technology (UK). He has a Masters of Business Administration from Graduate School of Business; University of Cape Town obtained in 2004.

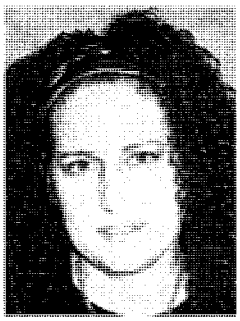
Mr. Alban Motsepe
Director, Rural Business Unit
Botswana Power Corporation

Alban Motsepe is Director of the Rural Business Unit at Botswana Power Corporation and is responsible for electrification of villages and 183,651 customers. Its mandate is to provide communities access to electricity through both grid connected and off-grid solutions. The Rural Business Unit is responsible for purchasing power from Generation, Transmission, Distribution within BPC and from across the 36 cross-border supply points with Namibia, Zimbabwe, Zambia and South Africa. Botswana Power Corporation (BPC) is the sole electricity utility responsible for generation, transmission, distribution and supply of electricity in Botswana. It has a total of 267463 customers and a winter maximum demand of 542MW (2012).

Mr. Motsepe joined Botswana Power Corporation in 1981 and worked his way up from an Electrician to Divisional Engineer in the Distribution Department before becoming Director, Rural Business Unit in 2006. His achievements include the electrification of over 260 villages across the country as Project Manager and also as Director of the Rural Business Unit. He was a founding member of the tripartite group comprising Government of Botswana, UNDP (representing the Global Environmental Fund, GEF) and Botswana Power Corporation which set up the current effort by Government to disseminate solar based technology solutions

across the country through BPC Lesedi where he is currently the Board Chairman. BPC Lesedi is a proprietary limited subsidiary of BPC in partnership with EDF of France established to take alternative energy solutions to communities without access to grid based electricity in Botswana.

Mr. Motsepe has a Post Graduate Diploma in Power Transmission and Distribution from the University of Bradford, UK, obtained in 1985. He also has a Post Graduate Diploma in Utility Management from the University College of Dublin, Ireland obtained in 1992. He is a Fellow of the Botswana Institute of Engineers and a Chartered Engineer and Member of the Institute of Engineering and Technology (UK).



Ms. Margaret Mutschler
Head of Projects
NamPower

Margaret Mutschler joined NamPower's executive management as the Head of Generation in 2003. From July 2004 to July 2007 she was dedicated to leading the Kudu Gas to Power project for NamPower. In 2007 she moved to the Power System Development unit in NamPower and took ownership of the new generation projects in the unit. Under her leadership the Anixas Diesel fired power station and the extension of the Ruacana Hydro power station was concluded. Since January 2013 her responsibility was expanded to cover the Renewable Energy Section in NamPower as well.

Margaret Mutschler completed her Electrical Engineering degree at the University of Stellenbosch in 1991. She obtained her Masters in Finance and Financial Law from The University of London in 2011.

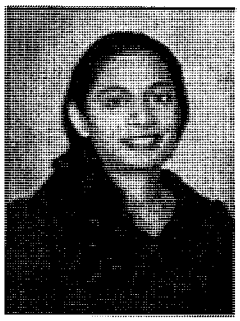
Mr. Vignesh Nandakumar
Country Manager, South Africa Operations
SunEdison

Vignesh Nandakumar has been involved with South Africa operations for SunEdison since inception. He was responsible for SunEdison participation in the first two rounds of the Renewable Energy Independent Power Producer Procurement (REIPP) program. Prior to SunEdison, he worked in R&D and manufacturing on next generation hard disk drives for Seagate Technology in the United States and in Singapore.

Vignesh holds a B Tech in Electrical Engineering from IIT Madras, an MS from Washington University and an MBA from ISB Hyderabad.

Mr. Kumesh Naidoo
Program Manager: Solar Park Feasibility Study
Central Energy Fund

Kumesh Naidoo is currently employed at CEF (SOC) Ltd. as a programme manager, responsible for the management of the DoE Solar Park Feasibility Study. His prior responsibility at CEF included the development of landfill gas to electricity projects and developing Clean Development Mechanism projects. Previous employment includes, DBSA, Eskom and Sappi Fine Paper. Kumesh holds a Bachelor of Engineering Degree from The University of Birmingham and a MBA from Buckinghamshire Chilterns University College.



Ms. Jasandra Nyker
Chief Executive Officer
Biotherm Energy (South Africa)

Ms. Nyker is the Chief Executive Officer of BioTherm Energy, a renewable energy investment and independent project development platform focused on sub-Saharan Africa. BioTherm is in the process of constructing three renewable projects as part of Round I of the South African Renewable Energy Independent Power Producers Program ("REIPPP"), and is the only South African company to have secured three projects.

Prior to this, Ms. Nyker managed the direct investment portfolio on behalf of the PCG Clean Energy and Technology Fund, a $680mn global energy and clean technology investment fund. She played an integral role in transaction sourcing, due diligence, investment execution and post-investment management. At part of this role, she reviewed and evaluated over 700 investment opportunities and invested in 13 companies across multiple sub-sectors, technologies and geographies. The portfolio included investments in green infrastructure (sugar ethanol, co-generation, wind projects and solar base-load applications), solar technologies, wind turbines, water (desalination, purification) and energy efficiency technologies.

Ms. Nyker was previously a board director on four portfolio companies (Brazil, USA) and a board observer for three companies. Post investment, she played an active role in business development, fundraising (debt and follow-on equity) and international market rollout. She also served as an advisor to a Middle Eastern National Oil Company's Energy Venture Fund.

Prior to joining PCG, Ms. Nyker worked for Booz Allen Hamilton in London, where she focused on alternative energy and private equity related projects. A significant portion of her time was spent establishing and investing an alternative energy fund for one of the leading national oil companies in the Middle East, for which she subsequently led multiple alternative energy investments. Before that, she worked at Lehman Brothers in London. She also worked for Brait Private Equity and Nedcor Investment Bank in South Africa.

Ms. Nyker holds an MBA from the London Business School, where she was a Merrill Lynch Scholar, and a Business Science degree in Finance from the University of Cape Town.

Ms. Paula Owen
Projects/Sales
SunPower Corporation

Mr. Terry Peterson
Solar Power Consultant

Terry M. Peterson is an independent solar power consultant with 40 years of experience in all major PV and solar thermal electric technologies, including research program management for over 17 years on the staff of the Electric Power Research Institute (EPRI) and over a dozen years working with various industrial, university, and national laboratory solar programs.

His recent activities include supporting Independent Engineer due diligence for DOE Loan Guarantees on solar projects totaling over $5 billion, serving as Chairman for the U.S. DOE 2005 and 2007 Solar R&D Program Peer Reviews, as 2010 peer reviewer of DOE's Concentrating Solar Power research, and as a core-team member of the Western Governors' Assoc. Solar Task Force supporting implementation of the WGA's resolution to install 30 GW of clean energy by 2015. He supports the Electric Power Research Institute as its principal solar consultant, the U.S. DOE's Solar Program as peer reviewer and advisor, and numerous private clients as a consultant on solar technology risk and utility issues. While at EPRI, Terry led work on PV and solar thermal-electric technology development and demonstration projects and he also managed EPRI's work on understanding dynamics of green power markets. Earlier he was a research engineer for Chevron Research Co. for over 8 years and a staff scientist at Lawrence Berkeley National Laboratory. He holds a B.A. in Physics from the University of California at San Diego, an M.A. in Physics, and a Ph.D. in Materials Science and Engineering, both from the University of California at Berkeley.

Mr. Cobs Pillay
Deputy Director: Green Economy
South Africa Department of Trade and Industry

Mr. Greg Retzlaff
Manager of Renewable Energy Technical Services – Africa
Black and Veatch

Greg Retzlaff, possesses 40 years of experience that is a unique blend of project development and due diligence, supported by a strong background in project management, construction, technical engineering support, and operation.

Mr. Retzlaff is currently Black & Veatch's Manager of Renewable Energy Technical Services – Africa, supporting the private sector IPP market including the DOE REIPP projects and projects with private industrial off takers. Mr. Retzlaff also spent a year supporting Eskom's biomass co-generation initiative.

Prior to providing Eskom support, Mr. Retzlaff founded and managed for 14 years, STRATEGIC ENERGY SOLUTIONS, INC., a specialized professional consulting company providing services to energy providers, and industrial and commercial energy users. The company aided independent power development companies with their project development, engineering, due diligence, operation and construction activities, predominantly in the US. In the past, Mr. Retzlaff participated in 14 due diligence initiatives involving 90 facilities, 37 of which were visited by Mr. Retzlaff.

Mr. Retzlaff's areas of special expertise include due diligence reviews, engineering analysis of industrial energy applications, project management, cogeneration expertise, facility optimization and project development support. Mr. Retzlaff has assisted clients evaluate and develop, energy projects and engineering solutions to power and steam issues utilizing multiple fuels and technologies, both domestically and internationally. Besides his US work, assignments have been completed by Mr. Retzlaff in India, Australia, Bangkok, Turkey, Korea, Argentina, South Africa and others.

Prior to founding STRATEGIC ENERGY and while employed by Pacific Generation, a PacifiCorp subsidiary, Mr. Retzlaff served as Director of Engineering, Project Development, where he managed and coordinated the project engineering activities to screen and investigate 60 domestic and international development opportunities. Engineering analysis, economic feasibility studies, and due diligence reviews were regular activities completed for power projects being considered for construction, investment or purchase.

Mr. Retzlaff received a Bachelor of Science degree from Oregon State University, holds a Professional Mechanical Engineer license in three states and a Professional Environmental Engineer's license in Oregon.

Mr. Daniel Schwab
Business Development Consultant
BrightSource Energy, Inc.

Mr. Oagile Setlhare
Senior Energy Engineer
Botswana Department of Energy

Oagile Setlhare is responsible for the conceptualization and implementation of Renewable Energy projects at the Botswana Department of Energy which addresses the Government Policy statements. His previous experience includes the rollout of renewable energy projects involving solar homes systems and community based pilot projects, facilitation of feasibility studies for solar thermal plants and consultation for the establishment of a Renewable Energy Feed-In Tariff. Mr. Setlhare has an MSC in Engineering Management from Brunel University and Bachelor of Engineering with a concentration in Mechanical Engineering from the University of Botswana.

Ms. Rentia van Tonder
Head: Green Industries SBU
Industrial Development Corporation

Rentia van Tonder, graduated from the University of Pretoria in South Africa, obtaining a BSc (Mathematics and Mathematical Statistics) and BSc (Hons), and then joined one of the largest banking groups in South Africa, ABSA. She completed her MBL (Masters in Business Leadership) from University of South Africa on a part-time basis, and then joined the Industrial Development Corporation in 1996 as a Statistician in the Economic Research department.

Rentia was seconded to the office of the minister of Minerals and Energy in 1999 for 6 months and joined the IDC mining business unit when she returned in 2000. Subsequently Rentia was promoted to Head: Wood and Paper SBU in 2003, where the unit started to change its approach to fund more green, sustainable projects supporting the overall drive towards a low carbon economy. Rentia was then appointed to a new position Head: Green Industries from 1 April, 2011 to establish the green unit and position IDC as the leading financier in the green economy in South Africa.

Dr. Greg Wilson
Director, National Center for Photovoltaics
Department of Energy National Renewable Energy Laboratory (NREL)

Greg Wilson is the Director of the National Center for Photovoltaics at the National Renewable Energy Laboratory in Golden, Colorado. Prior to joining NREL in 2011, he was responsible for solar materials technology evaluations related to acquisition and equity investment opportunities in his role as Director of Corporate Business Development at MEMC-SunEdison. Over Greg's 16 year career at MEMC he also held a number of semiconductor research and development positions including Director of Layer Transfer R&D, Director of New Materials R&D and Director of Epitaxial Silicon R&D. Greg holds a D.Sc. in Chemical Engineering from Washington University.

Links for Solar Sector Resources

U.S. Federal Agencies

Department of Energy SunShot Initiative Homepage
http://www1.eere.energy.gov/solar/sunshot/

The DOE SunShot Initiative is a collaborative national effort to make solar energy cost-competitive with other forms of electricity by the end of the decade. The SunShot Initiative drives research, manufacturing, and market solutions to make the abundant solar energy resources in the United States more affordable and accessible for Americans. Since the SunShot Initiative was announced in February 2011, the Solar Office has funded more than 150 projects in Photovoltaics (PV), Concentrating Solar Power, Balance of System Costs and Systems Integration.

Department of Energy SunShot Initiative High Penetration Solar Portal
https://solarhighpen.energy.gov/home

The High Penetration Solar Portal was created by the U.S. Department of Energy (DOE) as a resource to aggregate the most relevant and timely information related to high penetration solar scenarios and integrating solar into the grid. The site is designed so that utilities, grant awardees, regulators, researchers, and other solar professionals can easily share data, case studies, lessons learned, and demonstration project findings. The High Penetration Solar Portal is part of the DOE SunShot Initiative, a collaborative national effort to make solar energy cost-competitive with other forms of energy by the end of the decade. Reducing the installed cost of solar energy systems by about 75% will drive widespread large-scale adoption of this renewable energy and restore U.S. leadership in the global clean energy race.

U.S. Department of Energy Information Resources Webpage
http://www1.eere.energy.gov/solar/sunshot/resources.html

DOE has organized links and information on solar energy technologies and the SunShot Initiative to make it easier for you to find what you're looking for including Solar Publications Library, Solar Energy Technologies Office Newsletters, Solar Energy Resource Center, Multimedia, Meetings and Workshops, and more.

Solar Energy Resource Center Webpage
http://www4.eere.energy.gov/solar/sunshot/resource_center/

SunShot, through the Solar Energy Resource Center, maintains a collection of resources on solar technologies and best practices to implement solar, both at the local level and with large-scale deployment. Resources include articles, case studies, fact sheets, how-to guides, model rules and ordinances, presentations, sample government documents, technical reports, tools, and webinars. These resources were developed by industry, local government, university, and national laboratory partners through the support of the DOE Solar Energy Technologies Program. The intent of providing these resources is to help accomplish the goals of the DOE SunShot Initiative.

South Africa

http://www.ipprenewables.co.za/

The nexus for information on South Africa's Renewable Energy Independent Power Producer Programme (REIPP).

Renewable Energy page, South African Department of Energy
http://www.energy.gov.za/files/renewables_frame.html

Features background information on projects in Solar, Biofuel, Hydro-Power, Wind-Power, Hybrid Systems and Tradable Renewables.

South Africa Department of Energy – Integrated Resource Plan for Electricity 2010-2030
http://www.doe-irp.co.za/content/IRP2010_2030_Final_Report_20110325.pdf

Botswana

Energy Affairs Division – Botswana Ministry of Minerals, Energy and Water Resources
http://www.mmewr.gov.bw/department/?dept=ead

Namibia

Ministry of Mines and Energy – Energy Directorate Homepage
http://www.mme.gov.na/directe.htm

Ministry of Mines and Energy – Strategic Plan 2012 – 2017
http://www.mme.gov.na/pdf/mme-strategic-plan-2012_17.pdf

South Africa: Electric Power Sector Snapshot

Overview

In South Africa, generation is dominated by Eskom, the national wholly state-owned utility, which also owns and operates the national electricity grid. Eskom was established in South Africa in 1923 as the Electricity Supply Commission. In July 2002, it was converted into a public, limited liability company, wholly owned by the government. The utility generates about 95% of electricity in South Africa. Approximately 88% of South Africa's electricity is generated in coal fired power stations. Koeberg, a large nuclear station near Cape Town, provides about 6.5% of capacity. Another 2.3% is provided by hydroelectric and pumped storage schemes. South Africa supplies two thirds of Africa's electricity and is one of the lowest cost electricity producers in the world. South Africa's rapid economic growth in recent years has resulted in electricity demand rising faster than anticipated.

Electricity distribution in South Africa is the responsibility of Eskom and 187 municipalities. The municipalities account for about 40% of total electricity sales and about 60% of the customer base.

South Africa's Solar Potential

South Africa's solar resources are outstanding. The annual 24-hour global solar radiation average is about 220 W/m^2 for South Africa compared with about 150 W/m^2 for parts of the USA, and about 100 W/m^2 for Europe and the United Kingdom. Annual photovoltaic (PV) panel-assembly capacity totals 5MW, and a number of companies in South Africa manufacture solar water-heaters. In sum, energy studies identify solar energy as the most readily accessible renewable energy resource available in South Africa.

Integrated Resource Plan 2010 – 2030

To assist with the planning, the government has produced The Policy-Adjusted Integrated Resource Plan (IRP2010), approved in 2011, which will be continuously revised and updated.

A copy of the plan can be downloaded at:
http://www.doe-irp.co.za/content/IRP2010_promulgated.pdf

IRP2010 outlines the proposed electricity generation capacity mix for South Africa for the period 2010 to 2030, and expects that this will be delivered through a range of projects that will be implemented by Eskom and the public sector (accounting for 70% of the capacity) and various independent power producers (IPPs) (accounting for the remaining 30% of the capacity). The plan also factors in demand savings over the period, to be achieved through energy efficiency and demand side management (DSM) strategies.

Eskom is to play a key role in achieving the objectives outlined in IRP2010 and the utility is currently pursuing a suite of capacity-expansion projects valued in the range of $69.83 billion (R500-billion). These projects, which will bring more than 11 000 MW of additional power on stream by 2020, form part of what the IRP2010 refers to as 'committed build'.

Key among the projects currently under development by Eskom are the return to service projects, which will bring previously decommissioned capacity back into production; the Medupi and Kusile projects, which will introduce significant new coal-fired baseload capacity to the country's power system; and the Ingula pumped-storage project, which will introduce additional peaking capacity. There are also two renewable power projects currently under development by the utility – the Sere wind power project and the Upington concentrating solar thermal power project.

The future generation plan, premised on the IRP2010 document, will see power capacity expanded to 89 532 MW by 2030. According to the plan, this will include the introduction of 56 539 MW of new capacity, and the decommissioning of 10 902 MW of older capacity. Of the new capacity awaited, a small portion, some 14 000 MW, falls within the 'committed build' category, while details on the projects that will provide the balance of the new capacity are still to be finalized.

Generation

The plan shows a heavy ongoing reliance on coal-fired power, with coal expected to account for 45.9% of South Africa's electricity in 2030, down from 86% currently.

Coal Generation

The bulk of the new coal-fired capacity will be developed by Eskom, although there is 6250 MW of coal-fired power that is currently uncommitted. This will include domestic production and imports, with the first 500 MW of the currently uncommitted coal-fired power expected to come on stream in 2014, followed by a further 500 MW a year later. It is likely that some of the early non-Eskom coal additions will be based on fluidized-bed combustion technology, using coal discard dumps in Mpumalanga.

Nuclear Generation

The second-largest component of the country's energy mix in 2030, as outlined by IRP2010, will be nuclear power which will be the source of 12.7% of South Africa's electricity. Currently, South Africa has only one nuclear power station, Koeberg, but the plan envisages the introduction of additional nuclear capacity from 2023, with a total of six tranches added by 2030. The cost of additional nuclear capacity includes the introduction of additional safety measures.

Renewable Generation

The plan also includes the introduction of significant renewable power by 2030, including wind, concentrated solar and photovoltaic solar power generation. Together, these three sources are expected to contribute 21% of South Africa's total energy in 2030.

South Africa is expanding renewable energy, weighing up nuclear energy, exploring carbon

capture and storage (CCS) technologies, and leveraging Demand Side Management (DSM) initiatives. South Africa's public electricity utility, Eskom, also has a target to reduce dependence on conventional coal to 70% by 2025, and to provide at least 1 600 megawatts in renewable capacity by 2025 (mostly large-scale solar and wind).

Other Sources

The energy mix outlined in IRP2010 also includes power from open-cycle gas turbine, combined-cycle gas turbine, pumped-storage, and hydro sources.

Independent Power Producers (IPP)

The additional capacity that Eskom will introduce to the national grid in the coming years will need to be supplemented with power from independent operators, if South Africa is to avoid future power shortages. The SAG has announced that 30% of all new build capacity will be supplied by IPPs.

Legislation has been proposed to create an independent system and market operator (ISMO) that would buy the power produced by both Eskom and the private operators. Meanwhile, a significant pipeline of private power projects exists.

Demand-focused Initiatives

To relieve pressure on the generation system in the short-term, the government has also been trying to reduce demand. Demand side management is recognized in the IRP2010 document, which cites energy efficiency as an important contributing factor to the overall energy system in South Africa, and projects a savings level of 3420 MW by 2030.

It is expected that the National Energy Efficiency Agency (NEEA), under the rearranged South African National Energy Development Institute, will lead the way on energy efficiency projects.

Meanwhile, Eskom has been authorized by the National Energy Regulator of South Africa (NERSA), through the multiyear price determination (MYPD), to fund DSM efforts to the value of $761 million (R5.45 billion) over the MYPD period from 2010 to 2013.

A component of the demand response program could involve the deployment of residential demand-management solutions, using either smart metering or Eskom's so- called 'utility load manager', which would enable it to remotely switch off key energy- consuming appliances.

Funding

Securing funding has been challenging for Eskom, and it was only in 2010, when government announced its equity injection, that Eskom was confident that it would be able to proceed as planned with all the projects and contracts to which it was committed.

The National Energy Regulator of South Africa (NERSA) approved Eskom's tariff increase application of 24.8% from April 1, 2010, and subsequent increases of 25.8% and 25.9% for 2011/12 and 2012/13 respectively. Eskom's finance director has indicated that the utility could request two further increases in the range of 25% a year in 2013/14 and 2014/15. In addition to raising debt on the domestic capital markets, Eskom is pursuing funding on the domestic and global debt markets through a bond issuance program. The utility is also tapping into funds available from development finance institutions, including the Development Bank of Southern Africa (DBSA), the African Development Bank (AfDB) and the World Bank. The AfDB approved a $2.79 billion (R20-billion) loan to Eskom in 2009, to assist in financing the Medupi project, as well as signing a 20-year $690 million (R5-billion) loan to fund the utility's capex program in 2008. Further, in 2011, the AfDB approved a loan of $365-million for renewable energy projects, including $265-million from its own resources and $100-million from a Clean Technology Fund. Eskom has also secured a $3.91 billion (R28-billion) loan from the World Bank.

Eskom is also making use of export credit agency finance associated with capital equipment and services imports from Asia, Europe and the US.

Eskom's ability to borrow funds for its investment program has been supported by a package of government guarantees. Initially, government offered to guarantee $24.58 billion (R176-billion) worth of the utility's debt, but expanded this to $48.88 billion (R350- billion) in late 2010.

Eskom's funding gap has been closed, for now. However, the IRP2010 includes a category of projects known as 'new build options' – projects that are not, as yet, clearly defined – in which Eskom is expected to be a significant participant, and for which the utility will require substantial additional funding.

Best Prospects/Services for U.S. Companies

Products and services with immediate need or potential in South Africa include:

- Construction of New Power Station
- Independent Power Producers (IPPs)
- Energy Efficiency Technologies
- Transmission and Distribution Equipment
- New Plant Equipment and Related Systems
- Systems Control Equipment

Botswana: Electric Power Sector Snapshot

Overview

Botswana currently imports about 80 percent of its electricity from neighboring countries, but this is set to change as Botswana rapidly expands domestic energy production. The first 150MW phase of the Chinese-built 600MW Morupule-BI coal-fired power station is expected to come online in April 2012. Morupule -BI is expected to meet Botswana's immediate energy needs. Although the domestic market for power in Botswana is small, it is nonetheless big enough to support another medium-sized coal-fired power station in the medium term.

Power production in Botswana for export by an independent power producer is also possible, as the legal infrastructure to accomplish this is now in place, and the regional market for power is large and undersupplied.

Botswana Solar Potential

Botswana has very high insolation, averaging about 250 W/m^2 around the clock in many areas

On average there are 300 days of sunshine a year

Botswana was one of the first countries to promote the use of solar in Southern Africa through the use of solar water heaters in government housing developments

Government-owned Botswana Power Corporation (BPC) is extending the provision of electricity to rural villages. Currently access to electricity in Botswana is 56 percent of the population and the target is to reach 80 percent by 2016. In the fiscal year 2012/2013, government intends to spend some $12.5 million to finance rural electrification.

While Botswana's potential for solar energy utilization (annual Direct Normal Irradiation equivalent of 3,000 kWh/m^2 in large parts of the country—among the highest in the world) and a national policy promoting renewable energy (with solar development enshrined in Vision 2016, NDP 10 and other documents), currently, solar energy is primarily used for solar water heating and small-scale electricity generation using PV technology, the latter mainly for rural applications. A 200MW solar thermal plant is under development but is still in its early stages. BPC and the government are exploring non-grid electrification, utilizing solar PV Solar Home Systems, rechargeable lanterns and a centralized off-grid system. A medium-scale (1.3MW) project is under development in Phakalane, but solar applications tend to be at the household level.

The government has decided to authorize a feed-in tariff regime which would allow independent power suppliers to provide power to Botswana's national grid at premium rates. Rates have not yet been published, however.

Best Prospects/Services for U.S. Companies

Products and services with immediate need or potential in Botswana:

- Energy equipment,
- Solar heating systems,
- Solar photovoltaic equipment and
- Engineering services

Namibia: Power Sector Snapshot

Overview

Namibia's rapid economic growth in recent years has resulted in electricity demand rising faster than energy planners had anticipated. NamPower, the government-owned power utility, operates generation facilities that were constructed in the 1970s. NamPower has three generation plants (249MW Ruacana Hydro plant, 120 MW Van Eck thermal plant, and 24 MW Paratus thermal plant) which generally do not produce at full capacity. In addition, a 21.5 MW plant in Walvis Bay began operating in late 2011. Peak demand is over 500 MW.

Namibia's Solar Potential

Namibia's solar energy potential is the highest in southern Africa and among the world's best, annually averaging over 270 watts per square meter on a 24-hour basis.

Namibia generates less than half the energy it consumes. NamPower has diversified its sources of imported power by signing power purchase agreements with utilities in Botswana, Zambia, Zimbabwe, the Democratic Republic of Congo (DRC), and Mozambique.

Over the long-term, the government and NamPower have committed to making Namibia energy self sufficient (and eventually a net exporter of power) by building new domestic generation capacity. While the government did not achieve its goal of 75% sufficiency by 2010, NamPower has made progress in efforts to increase its generation capacity. NamPower planned to commission a fourth turbine at the Ruacana Hydro plant in May 2012 that should generate 92 MW of power. A USTDA-financed study of the Van Eck Power plant completed in March 2012 provides Namibia with several options for extending the life of this plant.

NamPower also completed the N$3.2 billion TransCaprivi Interconnector which connects central Namibia directly with Zambia and Zimbabawe's power grids, thereby making Namibia less reliant on South Africa's transmission network.

The Electricity Control Board (ECB), Namibia's electricity regulator, accepts unsolicited power generation projects through its IPP framework. The Minister of Mines and Energy has final authority to approve/refuse IPP licenses, but the ECB makes recommendations on license applications which the Minister has historically followed. To date a number of IPPs have received licenses, but with very limited exceptions, no power purchasing agreements (PPAs) have been concluded with electricity producers.

Parties interested in developing small power generation facilities may also look to some of Namibia's Regional Energy Distributors (REDs). Some REDs are looking to develop their own - albeit limited - generation capacity. Partnering with a RED familiar with the ECB's IPP framework might result in faster project implementation.

Wholesale and consumer energy rates have slowly risen as the ECB has approved measures that permit NamPower to reach "cost reflectivity" on its tariffs by early 2012. Historically, energy

tariffs were capped, limiting NamPower's income and preventing adequate investment in new infrastructure.

With ample sunshine and wind resources (on the coast), Namibia has the capability to generate significant energy from renewable sources. The government, the ECB, and NamPower have all expressed interest in grid-connected solar and eolith renewable solutions, but to date, no significant initiatives have been implemented. While there has been foreign interest in the renewable energy sector, the rigidity of the government's pricing policies makes many projects unprofitable in the short term. NamPower and the ECB are exploring a number of options to resolve this issue, such as feed-in tariffs, or use of the tender process to obtain additional capacity.

Estimates are that fewer than 10% of rural households have access to electricity (either from the electrical grid) or through local power generation; in addition, up to 60 percent of Namibians are "off grid." As a result, in 2007, the government launched its Off-Grid Energisation Master Plan (OGEMP), an initiative that promotes the use of renewable energy for households not connected to the grid. The OGEMP recognizes that connecting remote rural communities to the electrical grid is expensive (in some cases prohibitively so), thus it was logical to promote off-grid (frequently renewable) solutions. Donors and government have worked with financial institutions to create low cost financing options so that rural communities and households can afford to purchase and maintain photovoltaic (solar) energy.

Best Prospects/Services for U.S. Companies

Products and services with immediate need or potential in Namibia include:

- Construction of new power stations;
- Electricity network upgrades;
- Refurbishment of turbines and related equipment;
- Transmission and distribution equipment;
- New plant equipment and related systems;
- Demand-side management solutions,
- Systems control equipment, and
- Renewable (primarily wind, photovoltaic, concentrated solar, biomass) energy products.

Opportunities

NamPower has conducted, or is near completion for feasibility studies on a number of new power generation and transmission projects indicated below. The lack of investors, concerns over exchange rates and pricing, and cross-border disputes are hampering implementation in some cases:

- Zizabona Connector Project – Additional transmission links to Zambia and Zimbabwe
- Kudu Power Project -- 500/800 MW gas plant in Oranjemund
- Orange River Hydro -- 10 mini hydro stations to be implemented in phases

- Arandis Coal Power Station -- 250/400 MW Station as a possible IPP
- Slop (Bunker fuel) Project – Slop fuel from ships for a 80 MW thermal power station
- Refurbishment options for Van Eck Power Station
- Baynes Hydroelectric plant

NamPower is already seeking investors for the Zizabona project and is expected to seek a partner for the refurbishment of Van Eck soon. However, not all of the projects noted will be approved for final construction and commissioning.

Companies interested in projects independent of NamPower may submit proposals directly to the ECB under its IPP framework.

Companies interested in large-scale renewable energy projects can engage NamPower and/or the ECB. There is specific interest in the following grid-connected renewable energy solutions:

- Wind farms – primarily around Luderitz.
- Concentrated Solar Power (CSP) – primarily in the southern (desert) regions of Namibia.

Web Resources

South Africa

Engineering News Website: www.engineeringnews.co.za
Central Energy Fund Website: www.cef.org.za
Department of Energy Website: www.energy.gov.za
Eskom Holdings Limited Website: www.eskom.co.za
South African National Energy Association (SANEA) www.sanea.org.za

Botswana

Ministry of Minerals, Energy and Water Affairs:
http://www.gov.bw/government/ministry_of_minerals_energy_and_water_affairs.html
Botswana Export Development & Investment Authority: www.bedia.co.bw
Botswana Power Corporation (BPC): www.bpc.bw
BPC Tenders: http://www.bpc.bw/tenders.htm
Ministry of Trade and Industry: www.mti.gov.bw
Department of Customs and Excise: http://www.finance.gov.bw/customs/

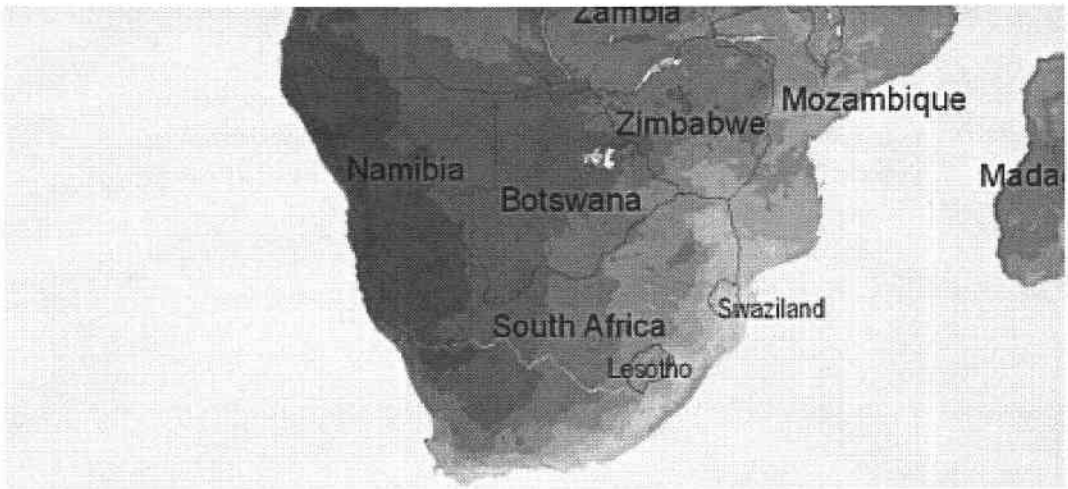
Namibia

NamPower http://www.nampower.com.na
Electricity Control Board http://www.ecb.org.na/
Ministry of Mines and Energy
http://www.mme.gov.na/energy/electricity.htm
Renewable Energy & Energy
Efficiency Institute http://www.reeei.org.na/index.php

Sources:

- Doing Business in Botswana: 2012 Country Commercial Guide for U.S. Companies, U.S. and Foreign Commercial Service and U.S. Department of State
- Doing Business in South Africa: 2012 Country Commercial Guide for U.S. Companies, U.S. and Foreign Commercial Service and U.S. Department of State
- Doing Business in Namibia: 2012 Country Commercial Guide for U.S. Companies, U.S. and Foreign Commercial Service and U.S. Department of State
- Solar Industries Association of Botswana
- GREEN ENERGY IN NAMIBIA, May 2009, Electric Power Board

Global Horizontal Irradiance in Southern Africa



Average annual sum (4/2004 - 3/2010)

0 500 1000 km

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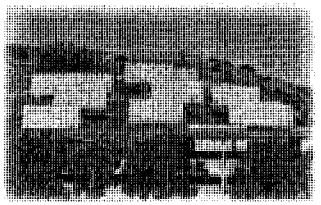
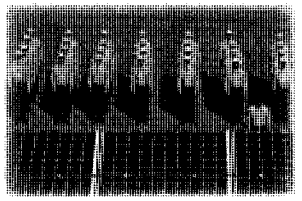
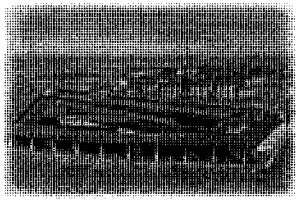
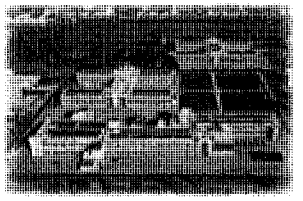
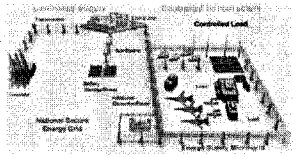
Source: GeoModel Solar s.r.o.

HARPER
CONSTRUCTION COMPANY, INC.

History

Harper Construction Company is a Design-Build General Contractor that was founded in 1974 by its Chairman, Ron Harper. Current Owner and President, Jeff Harper, continues the construction family tradition while maintaining its outstanding reputation with an uncompromising commitment to quality and safety. Renowned for our preeminence in Design-Build construction, Harper Construction provides excellence in a full spectrum of pre-construction, program management, design development, construction, interior design management, inspection and quality control services. Harper Construction continues to deliver the Best Value in building services by placing experienced construction professionals on every project undertaken.

Performance

Our team has been thriving in the DoD design-build arena for over 20 years. Our team specializes in Design-Build construction of a wide array of facility types in both public and private sectors.

The members of our team have national recognition as premier design-builders and contractors, each with a clear understanding of the objectives and processes unique to the any construction project process. Our team is ideally organized with a group of talented design professionals and experienced construction personnel to carry out the requirements associated with utility scale renewable energy projects and deliver the desired outstanding final product.

Our company has demonstrated an outstanding track record of designing and building military facilities by delivering projects on time and within budget with contract sizes varying from $2M to $130M. This has resulted in a 98% "Outstanding" rating as reviewed by the U.S. Department of Defense. This achievement demonstrates our team's commitment to client satisfaction and shows the team is well versed in accomplishing design-build projects of small to large scale.

Our team has recent and relevant experience designing and building photovoltaic projects as an integrated feature within our design-build facilities and in a wide variety of applications. Our team is skilled in each application of photovoltaic installations: roof mounted, carport mounted, carport mounted on top of parking structures, and ground mounted. Project sizes installed or currently in design range from 50 kW to 100 MW. We are well equipped to provide guidance on the appropriate renewable energy plan for wide range of applications. Each of our Design-Build projects provided a turnkey permitted, designed, installed, and commissioned system to the client. Our team has been responsible for all aspects of each system from design to operation. This includes design conformance with the solicitation and user requirements including considerations of performance, interoperability, maintenance, and cost effectiveness. In addition, in each case, Harper Construction has been responsible for completing all interconnection application documentation, design/installation in accordance with utility requirements, and all documentation required for State/Local/Federal rebates and incentives.

Integrity and Financial Stability

Harper Construction Company is fully committed to expanding the use of clean energy technologies and sustainable building infrastructure through innovative design-build solutions that harness the expertise of our highly skilled, cross-functional, engineering and construction teams.

Harper Construction stands on stable ground both ethically and financially. We are committed to exceeding client expectations to foster long lasting repeat client relationships that result in mutually beneficial results for all involved.

Harper Construction also understands the intricacies of risk mitigation required in the financing of renewable energy Power Purchase Agreement (PPA) contracts. We are prepared to meet these requirements with bankable risk-adverse design-build performance based contract language, reliable bonding capacity, and 3rd party insurance of technology partner projections.

Specialized Energy Solutions

Net Zero · Renewable · Micro Grid

An Affiliate of Harper Construction Company, Inc.

Energy Secure Microgrid Applications

Harper Construction and our affiliate Specialized Energy Solutions have been working closely with the US DoD to develop an array of technologies that optimize energy consumption, incorporate renewable generation, and provide cyber secure solutions which bring critical facilities energy security. Playing on years of R&D into this field, Microgrids have emerged as the unanimous answer to the energy security question. Consisting of the following key features, our current Microgrid solution ensures that power will be where it is needed, when it is needed, every time:

-Distributed generation with renewable integration
-Distributed local storage
-Autonomous and semi-autonomous switching and controls
-Autonomous non-critical load shedding
-Power smoothing and sharing
-Predictive analytics, pattern recognition, and resource optimization
-Secure Microgrid Energy Management & Maintenance Interface
-DoD Information Assurance and Certification Process (DIACAP)
-Scalable, extensible, modular open systems architecture

Our capable team of design and construction managers has been working in close collaboration with a diverse consortium of defense contractors to develop the Cyber Secure Smart Microgrid model which offers the most advanced solutions in energy security. The current capabilities of our Microgrid offering include:

-Critical load identification and survey
-Load shedding logic and modeling
-Microgrid system design and engineering
-Cyber security accreditation and certification
-Legacy system integration
-Procurement and installation
-Commissioning
-Operational and maintenance support

Whether it be a military installation, mining complex, university, or small village, our team is well positioned to meet the most complex of energy security challenges.

Silver Sponsors

AREVA

forward-looking energy

AREVA Solar designs, installs and operates solar steam generators (SSGs) for customers around the world. AREVA Solar is a subsidiary of AREVA Renewables, a global manufacturer of CO^2-free power generation equipment. AREVA group expects to be one of the top three companies in the renewable energy sector worldwide. AREVA Solar and Renewables are subsidiaries of AREVA group. Ranked first in the global nuclear power industry the AREVA group is also expanding its renewable energies offering, including wind, solar, bioenergies, hydrogen and storage. With these two major offers, AREVA's 48,000 employees are helping to supply ever safer, cleaner and more economical energy to the greatest number of people.

AREVA's global energy experience delivers concentrated solar power (CSP) solutions that help customers thrive in a dynamic energy market. Its CSP systems provide reliable, scalable and economic renewable energy solutions for both large-scale power generation and industrial steam customers. Its SSGs seamlessly integrate with standalone solar thermal plants, existing fossil-fired plants and process steam facilities. Simple to install and easy to operate, AREVA's solar solutions are designed to meet customers' exacting energy requirements.

With 300 megawatts of CSP in operation, under construction or in advanced development, AREVA Solar is one of the fastest growing CSP providers. It has operations and offices in the United States, Australia, India, South Africa, Saudi Arabia, France and throughout the MENA region.

Success in the CSP market is anchored in reliability and bankability. AREVA brings the technology, project and delivery services needed to ensure the success of CSP facilities to ensure a facilities' success. And AREVA performance guarantees provide security for owners and lenders. It's a winning combination that customers can take to the bank.

AREVA Solar's proprietary Compact Linear Fresnel Reflector (CLFR) technology produces superheated steam directly from the sun: its SSGs using flat, modular mirrors to focus the sun's heat onto elevated receivers, which consist of a system of tubes through which water flows. The concentrated sunlight boils the water in the tubes, generating high-pressure, superheated steam for use in power generation and industrial steam applications.

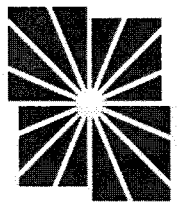
The most land-efficient CSP technology, AREVA' SSG's generates 1.5 to 2.6 peak power per acre than any other solar technology. This high energy density translates into lower costs, a smaller environmental footprint and greater access to existing power plant and industrial sites.

Unlike photovoltaic energy resources that immediately shut down during periods of transient cloud coverage, AREVA Solar's SSGs retain heat, allowing for a more seamless integration with the electric grid. For standalone power plants, AREVA Solar can also include a natural gas boiler back-up design. These solar-natural gas hybrid plants can meet the same dispatchability levels as a conventional power plant.

AREVA also offers an innovative CLFR/molten salt storage system. Using molten salt storage to extend daily solar electricity generation is not new, but combining it with CLFR technology is. This evolutionary CLFR molten salt storage system, commercially available in 2013, expands AREVA's suite of dispatchable solar CLFR solutions.

By using standard, commodity materials and high-volume, automated production, AREVA Solar can quickly scale-up to meet our customers' needs. Depending upon the size of the project, AREVA Solar can install a solar thermal field in 6 to 18 months.

Up to 90% of AREVA Solar's CLFR SSG design can be localized and the Company is committed to building local relationships and capabilities as well as providing employment, training, and research and development opportunities. AREVA Solar establishes local manufacturing facilities to allow 'close-by' deployment and is proud of our strategy of employing an un-skilled / semi-skilled workforce and providing targeted skills training.



BrightSource
Limitless

Delivering on solar's promise

BrightSource Energy designs, develops and deploys concentrating solar thermal technology to produce high-value steam for electric power, petroleum and industrial-process markets worldwide. BrightSource combines breakthrough technology with world-class solar power plant design capabilities to generate clean energy reliably and responsibly. BrightSource's LPT solar thermal system is designed to minimize impact to the environment and help customers reduce their dependence on fossil fuels. Headquartered in Oakland, Calif., BrightSource Energy is a privately held company with operations in the United States, China, Europe, Israel and South Africa.

BrightSource has approximately 1.8 gigawatts of power under contracts with Southern California Edison and Pacific Gas & Electric Company, California's two largest utilities. In addition, the company manages an approximately 90,000 acre development site portfolio in California and the U.S. Southwest that has the potential to accommodate approximately 9 GW of installed capacity.

A history of solar expertise

The principal members of our technical team pioneered the first utility-scale solar energy plants nearly three decades ago by designing and developing 354 MW of solar thermal electric power plants, which remain in operation today. In addition, the team has extensive finance and project development expertise, and has collectively developed, constructed, and managed more than 20 gigawatts, or GW, of solar, wind and conventional power projects worldwide. Today, the BrightSource technical team is building on this experience to advance the solar thermal industry by developing and deploying a solar power tower system that provides both higher solar energy conversion efficiencies and lower costs.

Clean, reliable, and cost-competitive energy

BrightSource's LPT solar thermal technology generates power the same way as traditional power plants – by creating high temperature steam to turn a turbine. However, instead of using fossil fuels or nuclear power to create the steam, BrightSource uses the sun's energy. BrightSource's system uses proprietary software to control thousands of tracking mirrors, known as heliostats, to directly concentrate sunlight onto a boiler filled with water that sits atop a tower. When the sunlight hits the boiler, the water inside is heated and creates high temperature steam. Once produced, the steam is used either in a conventional turbine to produce electricity or in industrial process applications, such as enhanced oil recovery (EOR). By integrating conventional power block components, such as turbines, with our proprietary technology and state-of-the-art solar field design, projects using our systems are able to deliver cost-competitive, reliable and clean power when needed most. In addition, by integrating our technology with natural gas or other fossil fuels through a process referred to as hybridization, projects using our systems are able to further increase output and reliability.

Bronze Sponsors

BLACK & VEATCH
Building a world of difference.

Black and Veatch – Company Profile

Black & Veatch Corporation is a leading global engineering, consulting and construction company with the mission of *Building a World of Difference*®. By advancing the frontiers of knowledge, we provide our clients with reliable solutions to their most complex challenges, thereby helping improve and sustain the quality of life around the world. Founded in 1915, Black & Veatch specializes in infrastructure development in energy, water, telecommunications, Federal, management consulting and environmental markets. Solutions are provided from the broad line of service expertise available within Black & Veatch, including conceptual and preliminary engineering services, engineering design, procurement, construction, financial management, asset management, program management, construction management, environmental, security design and consulting, management consulting and infrastructure planning. Black & Veatch is an employee-owned company with more than 100 offices worldwide. We have completed projects in more than 100 countries on six continents. Black & Veatch is ranked on the Forbes "500 Largest Private Companies in the United States" and is consistently in the top ranking for engineering design, including environmental engineering design, and construction firms.

SOLARRESERVE

SolarReserve, LLC – headquartered in Santa Monica, California – is a developer of large-scale solar energy projects with activities worldwide. SolarReserve has commercialized the world's leading solar thermal energy storage technology utilizing molten salt in a power tower configuration. SolarReserve's team of power project professionals have assembled an extensive 5,000 MW worldwide development portfolio of large-scale solar projects featuring its advanced solar thermal technology (also referred to as concentrated solar power or CSP) as well as projects utilizing photovoltaic technology.

SolarReserve's U.S. developed technology is the most advanced solar energy storage technology in the industry. SolarReserve's molten salt power tower design has the capability to deliver clean, reliable electricity at any time, day and night. With designs that can provide from 7 hours to 24 hours of full power energy storage, SolarReserve's power plants capture and store the sun's thermal energy and can operate 'on demand' just like a conventional coal, natural gas or nuclear power plant. However, SolarReserve's technology does not release the harmful emissions associated with burning fossil fuels or other hazardous wastes associated with conventional power plant technology, nor does it expose utilities and rate payers to volatile fossil fuel prices over its more than 25 year project life. Providing firm and predictable electricity generated from the sun, an unlimited fuel, SolarReserve's technology also provides grid stability and a solution to intermittent electricity generation, a problem from which most other renewable technologies suffer.

In addition to its market leading solar thermal technology, SolarReserve also designs and develops large-scale photovoltaic power facilities. In November of 2012, the company closed financing and started construction on two 75 megawatt photovoltaic projects located in South Africa. The projects will jointly cost approximately $586 million, making these two of the largest project finance transactions ever completed in South Africa and among the largest renewable energy projects in Africa.

For more information about SolarReserve: www.SolarReseve.com

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Supporting Organization

The Southern African Alternative Energy Association

The Southern African Alternative Energy Association (SAAEA) represents and actively promotes Renewable Alternative Energy Solutions in our region. Its focus is the whole industry, rather than one sector.

Wind, Solar, Biomas, Biogas, Bio Fuels, Green Products, Energy Saving, Alternative Energy, Energy from Waste, Fuel Cell Technologies etc.

The SAAEA advocate policy development on behalf of our members at decision making government level. We also promote understanding of the industry and its potential through tools such as industry events, forums, conferences, newsletters and publications, our objective is to provide borderless access to the information that can affect today's clean energy industries as much as tomorrow's world.

Our members share the belief that lowering our carbon footprint is as important as the doing of business itself because we understand that every small endeavor toward a green, sustainable world makes a difference.

We organize top management events and forums creating a networking platform for companies across the world.

Our members include research institutes, developers, contractors, consultants, suppliers and members of the public dedicated to building a greener planet.

Our projects include making information available re global warming issues, sustainable solutions/technologies to counter harmful carbon emission.

On the web: www.saaea.org

U.S. - Southern Africa Solar Workshop

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