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2016 Volume 13 Issue 2

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Contents

2

6

19

22

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Executive Director's Comment

There are numerous views on the present state of the African continent and its future. Many commentate on Africa's untapped potential.

Unpacking the challenges to unlock this potential is complex and sometimes quite emotive. Irrespective of the many diverse views on how to progress, there is a common theme both for South Africa and the rest of Africa. That theme is that infrastructure development will be the key.

The supply of energy is a vital element of infrastructural development. Coupled to water and sanitation, electricity or gas for the purposes of lighting, heating, powering of machines and appliances is an essential requirement.

A co-ordinated effort by both the public and private sector is required to allow for the supply of these basic services.

There are many opportunities for investors to partner with governments and achieve joint objectives in this regard. The cornerstone for success of such ventures are transparent tendering processes and sound relationships between all stakeholders. Economic and political stability and a fair playing field are essential factors against which investment decisions are made. In such an environment the provision of power, appropriately designed to meet African conditions will prove to be beneficial.

In all probability, decentralized energy platforms will be the most viable way to power Africa, with larger centrally located power stations gradually playing a lesser role. Renewable energy sources such as solar and wind power are strong contenders. These energy sources can be harnessed on a domestic scale or upsized to meet needs of towns. This flexibility allows for fast implementation.

Over and above the socio-economic benefits provided by the supply of clean energy, such systems present investment and job creation opportunities for those that choose to pro-actively pursue them.

This edition of Hot Dip Galvanizing Today features articles on solar power and some projects that illustrate the potential for this technology for our industry, country and the continent.

SA's developing solar energy landscape explained

Hartmut Winkler, Professor of Physics, University of Johannesburg (first published January 2016)

Solar power has a key piece to play as South Africa continues to assemble its large energy puzzle.

Until a few years ago solar panels were a rare sight in South Africa, largely limited to the roofs of a few affluent households. This is changing rapidly, driven by three factors: the worldwide drive towards renewable energy, a highly strained local electricity supply, and a steady drop in solar panel prices.

Taking the lead from other countries, South Africa committed to an energy generation infrastructure development plan for 2010 to 2030, known as the Integrated Resource Plan.

Under the plan the country aims to achieve 9 600 MW of solar power capacity by 2030. When the plan was drawn up in 2010, solar was limited to a few isolated panels on domestic rooftops, and until recently contributed nothing to the national power grid operated by the state-owned utility Eskom.

But that is changing.

Solar plants are being developed, most by the private sector under a specially designed procurement program. Eskom is also constructing some facilities.

Much easier, much cheaper

In the last ten years the defining development in solar energy has been the sharp drop in the prices of photovoltaic panels. There has also been modest technological advances in other solar technologies and in power storage.

Photovoltaics, or PV, is a process in which energy from light is absorbed in materials and then directly transferred to electrons, resulting in an electric current. Research advances over the years, especially those involving easily

The KaXu heliostat system. (Abengoa Solar)

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The KaXu plant is using parabolic trough technology. (Power technology)

available silicon-based materials, have made this an increasingly cheap solar technology. It is also now the most popular.

The simplest PV configuration has immobile solar panels, slightly tilted relative to the ground and facing northwards towards the midday sun. An example is the Droogfontein Plant near Kimberley in South Africa's Northern Cape province. Panel rows are placed in a way to ensure that each panel does not shade the one behind it.

A more sophisticated design, found at the Sishen Plant near Kathu, also in the Northern Cape, uses a single axis-tracking technology to counteract efficiency losses. Each row of panels steadily rotates along a north-south axis with the sun until it reaches a point where it starts to shade the row behind it.

In two-axis tracking systems, panels constantly face the sun squarely. The Herbert and Greefspanplants near Douglas in the Northern Cape use this technology. The cost of the additional tracking motors is compensated for by the capture of more sunlight.

Concentrated solar power

Concentrated solar power, or CSP, technologies are based on the redirecting of sunlight, normally by mirrors, to a common focal point, which as a result becomes extremely hot.

This heat is transferred by fluids to a nearby electricity generating unit, where water is boiled to drive a turbine. This is similar to the process in coal power stations where coal is burnt to generate heat.

CSP technologies include the solar tower, where a multitude of mirrors continually realign themselves to reflect sunlight to a hot spot on the tower. Khi Solar 1, under construction near Upington, is a representative of this class.

The parabolic trough technology requires long rows of concave mirrors focusing sunlight onto pipes running just above. The already operational KaXu near Pofadder uses this technology, and similar plants in Bokpoort and XiNa will be added soon. A related technology, linear Fresnel, appears in some of the proposals for future South African solar plants.

Finally, there is a hybrid technology, concentrated photovoltaics, where the collecting focal point contains a PV receiver rather than a heatable fluid. This design was used for the Touws River solar plant in the Western Cape province.

The pros and hidden cons

Solar energy almost completely avoids emissions, uses a limitless energy resource and is becoming increasingly inexpensive. As such it is promoted as a major clean contributor to solving the world's energy crisis.

At the same time, it is important to recognise the shortcomings of solar power. Solar energy generation is only possible during daytime and in reasonably cloud-free conditions. In South Africa that corresponds to typically eight hours per day on average.

For PV, the poorer the alignment between the sun and a solar panel, the worse the efficiency. Dust build-up on a panel further blocks sunlight, and photovoltaic panels don't function properly if even only a fraction of the surface is shaded.

The quoted power produced by a panel or a solar plant is mostly obtained under near-optimal solar exposure. And the daily average power generated is much lower.

Energy storage also remains a challenge. Despite this, solar energy remains an attractive option.

All the completed solar power plants are part of South Africa's electricity supply as they are fully linked to Eskom's grid. Solar power already feeds more than 1 MW onto the grid on a sunny day. This is a significant amount, and it makes it considerably less likely that the country will suffer power cuts in 2016.

ANNOUNCEMENT:

Appointment of Marketing Manager – Hot Dip Galvanizing Association

It is with great pleasure and optimism that I am able to advise that Mr. Anthony Botha has joined the Hot Dip Galvanizing team. Anthony will take on the task of Marketing Manager. This role primarily centers around liaison with engineers, fabricators, architects and those that have cause to consider hot dip galvanizing as their preferred method of corrosion control. Anthony has also taken on the task of publishing Hot Dip Galvanizing Today. Plans are afoot to optimize this valuable marketing and communication tool.

Anthony joins us with experience in both the engineering and marketing fields and will no doubt be a valuable asset to the association. In order for us to get to know Tony, a profile article appears in this edition.

Robin Clarke, Executive Director

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COATINGS & CHEMICALS

Solarframe – The case for hot dip galvanizing

Pierre Frylinck, Managing Director – Solarframe Solar Mounting Systems

Renewable energy represents a significant long term investment with return on investment expected in no less than 10 years, depending on type of installation. This return on investment can be severely impacted by inferior products which do not produce as expected for the full term of the investment.

This return on investment is further impacted by the devaluing of the rand against major currencies which negatively impacts the import cost of solar mounting equipment, inverters, switchgear and batteries. For renewable energy to remain an option for those that want to invest in long term sustainability and self-sufficiency, it has to remain within the budget of the middle class South African.

The other factor which negatively impacts return on investment is the serviceability of the components that are used in installations, whether it be ground mounted solar farms or an off grid domestic installation. One would expect that every component in the installation would carry the same serviceability as the panels, which carry a 25 years guarantee from most manufacturers. In the past the weakest link was undoubtedly the guarantee of the battery bank which manufacturers limit to 5 years. However, new technology has seen the emergence of service free, long life, deep cycle batteries which eliminate the battery bank as the weakest link. The next consideration that would impact the lifespan of PV solar installations is the mounting structures. Unfortunately mounting structures bring up the rear, as it were, when it comes to installation budget, with many consumers willing to settle for inferior products which cannot offer the same expected lifespan as the rest of the installation.

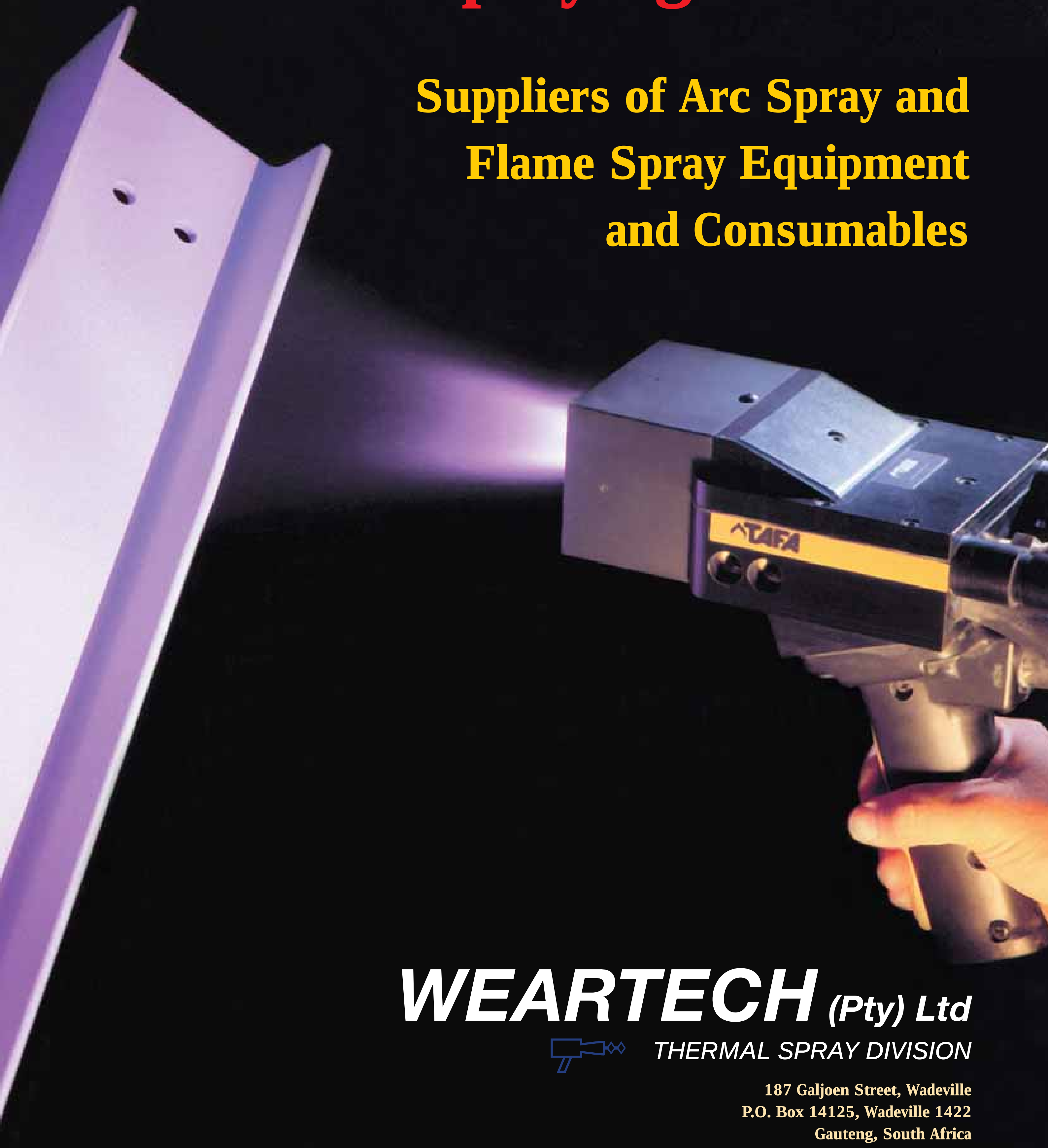
Insufficient wind loading design or weak anti-corrosive properties will inevitability lead to premature failure of the installation, in turn leading to significant loss off investment. Many installers and clients buy imported mounting solutions from Asia purely from a budgeting perspective, without considering the pitfalls.

Industry standards for corrosion protection of mild steel call for hot dipped galvanised treatment of steel with a coating thickness no less that 85 micron. I will grant that the finish on hot dipped components cannot compare to that of the plated finish (< 15 microns DFT) which is usually associated with the imported products. Should one expect the mounting structure to perform as well as or even better than the other solar components, it would be good to consider the following:

1. Electro-galvanized, zinc-plated, mild steel is coating is in the region of between 10 - 12 micron. This coating is deposited on the metal without penetrating the surface i.e. it is a pure zinc layer. Scratches and dents which damage the plated layer start showing signs of corrosion within 48 hours of being installed in our coastal environment. As such these plated components will need maintenance far sooner than a similar hot dip galvanized component.
2. Hot dipped galvanised components on the other hand are dipped at a temperature of 450°C which produces zinc-iron alloys from substrate through to a tough patina layer on the outermost surface. This adds corrosion control even if the hot dip galvanized coating suffers minor penetrations through the outermost layer. The proven service life of 25 years in coastal environments well exceeds that of the cheaper plated components.
3. Consideration should be given to the fact that tile roof brackets are out of sight and corrosion failure will only be evident with system failure. Hot dipped galvanized components benefit in that all surfaces of the component including the inside of tubes thereby ensuring complete corrosion control of the all surfaces exposed to the environment.

At Solarframe we do not consider any other method of corrosion control for any of our steel products whether that be steel tile roof brackets or steel ground mounted structures, carports or custom designs. It stands to reason that the customer and Solarframe both want the same dependable quality of our steel components as we do on our non-ferrous components to ensure customer peace of mind with maximum return on investment and a hassle free renewable energy experience.

Zinc Metal Spraying?



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The market for hot dip galvanizing in solar power electricity applications

Extracts and updates from a paper presented at the APGGC by RT White and Dr FE Goodwin. International Zinc Association, USA.

Solar power electricity generation systems tend to be located in remote areas where grid power is often non-existent or where sufficient land and sun is available to allow power feed back to the grid. The total installation is transported to site and erected with a view that there must preferably be no repair to the coating system after erection of the installation and the corrosion protection system should be maintenance free for an extended period of time. Hot Dip Galvanizing is ideally suited to such applications as its inherent toughness, durability and cathodic protection of steelwork ensures that solar installation is essentially maintenance free.

Morocco and South Africa are the largest new Concentrated Solar Power (CSP) installation players globally. An additional 50GW of solar came on stream in 2015 such that investment in renewable generation in total was double that of conventional power (coal, gas, oil). It is now the most important part of the power investment industry globally with an estimate of around 20% of the per annum usage of Zinc in the General Galvanizing market sector.

The pressure to use renewables for power generation has resulted in some interesting changes in energy delivery. For example, the United Kingdom now uses renewables for over 25% of its power generation more than that provided by coal. This is up from 9% just five years ago! The UK now has the largest wind farm and the largest off-shore solar park in the world. Germany still leads in Europe with 33% of its energy generation coming from renewables up from 27% two years ago [(1)].

Solar power accounted for some 55% of investment in renewables in 2013 compared with 36% for wind power [(2)]. The growth of the use of solar power globally is driven by a number of factors which differ in different regions. In many developed regions, the desire to reduce the carbon footprint has resulted in rapid take-up of renewable energy sources. In the developing world the absolute need for power and the lack of integrated infrastructure has resulted in the growth of off-grid or micro-grid systems which, by definition, are suited for smaller scale generation facilities which favour renewable "close to use site" situations.

Solar facilities such as photovoltaic and concentrated solar power offer unique opportunities in many areas of the world and have become large consumers of galvanized steel. The remote locations of many sites means that the entire installation is designed and pre-fabricated as far as possible prior to transport to site where these plants will have to operate for periods in excess of 20 years with little or no maintenance possible. Most financing contracts work off 20 year feed-in-tariffs (FIT) agreements but it is expected that the installations will run for much longer than this. A requirement for solar power is that maximum solar energy should be available and as regularly as possible. This increases the efficiency of the system. The need for strong sunlight offers a challenge for conventional organic coatings where UV breakdown can compromise coating performance. This is complicated by the fact that IR and UV intensities vary according to latitude so different blockers are required for organic coatings in different regions [(3)]. The use of metallic coatings alleviates this allowing the use of global specifications and hot dip

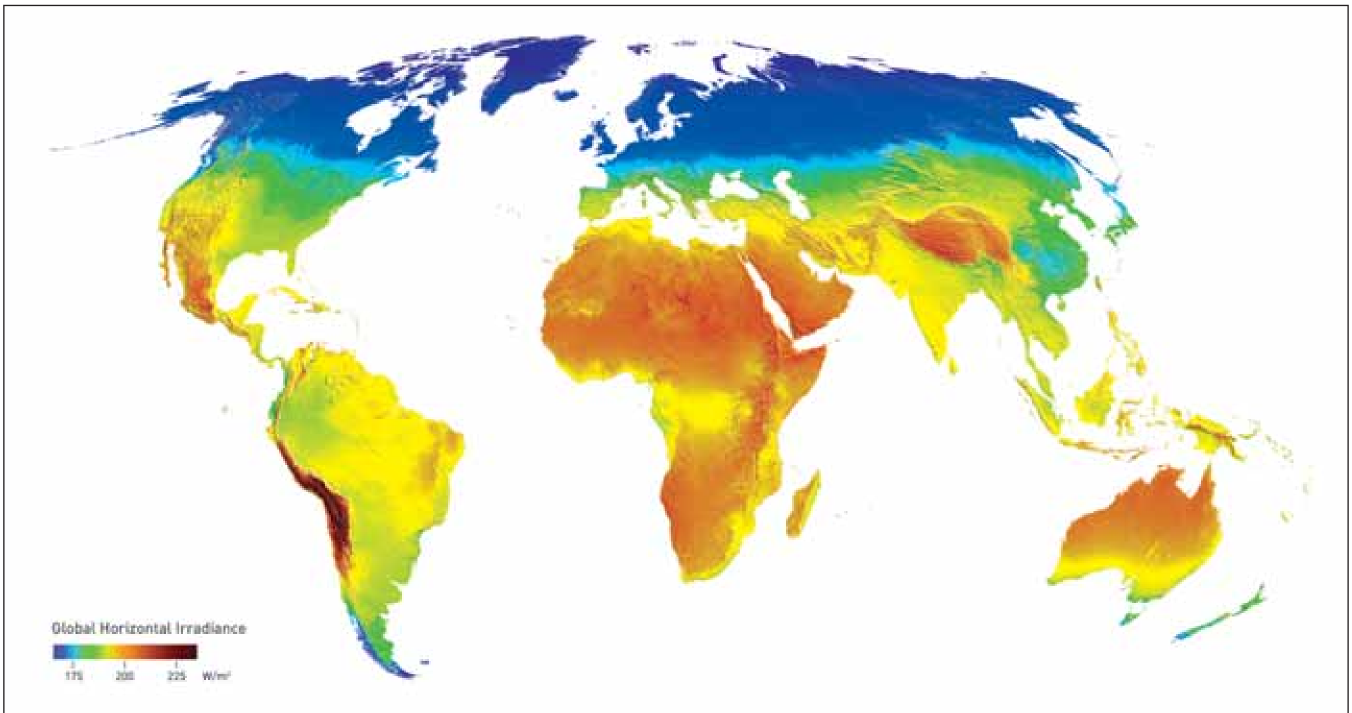

Figure 1: Global Solar Irradiation map [(4)].

galvanizing has been demonstrated as the most cost effective coating system with the necessary properties of durability and ruggedness.

Whilst solar has been adopted in non-optimal regions such as Europe, the greatest advantage of solar use would be in the regions where solar irradiance is highest as shown in *Figure 1* [(4)]. The clear advantages offered throughout much of the African continent are clearly visible as are those for Australia and California. Overall, Africa offers the greatest usable solar power potential of any continent with East Africa, South Western Africa and the Sahara desert offering the greatest potential. An interesting observation is the low power availability in Africa currently *(Figure 2)* [(5)]. One reason for the focus here on Africa is that infrastructure development is driving economic growth such that six out of the ten fastest growing economies are in Sub-Saharan Africa (SSA) [(6)]. Ethiopia for example has had GDP growth rates in excess of 10% per annum for over a decade. Africa remains the last opportunity for massive

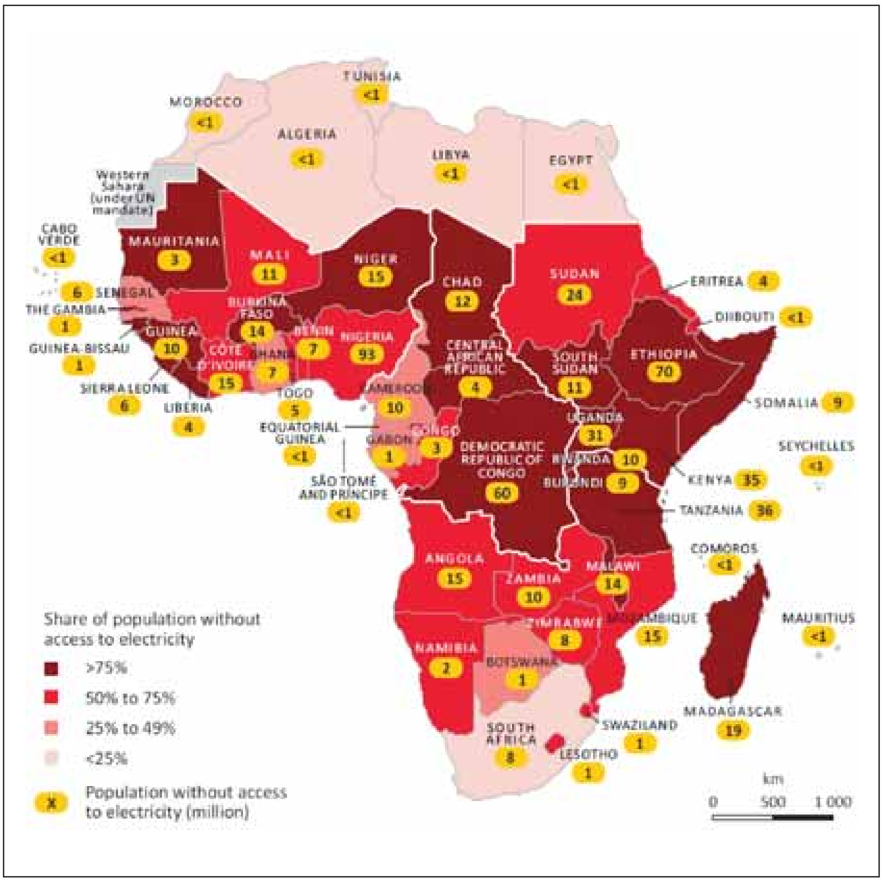

Figure 2: Number and share of people without access to electricity in Africa – 2012 [(5)].

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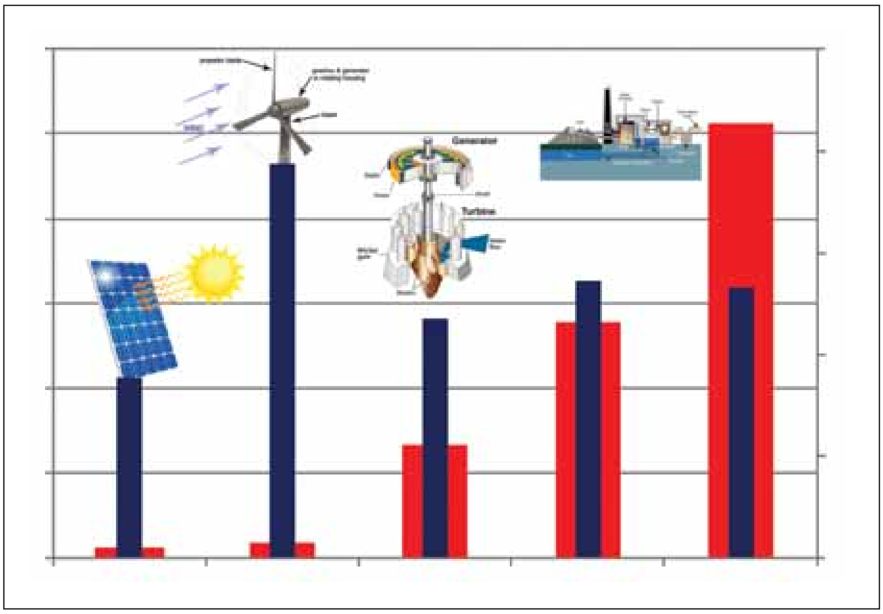


Figure 3: Reliance on "Big-Power" comes with its consequences as shown by the cost over-runs [7].

infrastructure development and galvanized steel should play an important role. The African market is larger than China, USA, India, Japan and all of Europe combined, with a population of almost 1bn people and a heavily skewed age range of the majority of the population being most under the age of 25 years. Africa has shown itself capable of leapfrogging over technology completely. This is evident when considering the mobile telephony system which is well developed and has done away with the need for fixed line systems, especially in rural areas.

The majority of solar installations are public private partnerships and this has enabled rapid uptake of technology through experience pooling and rapid project development through agreed supply tariff pricing or individual customer agreements where necessary. Thus, bureaucracy is minimised and project lead-times and costs over-runs are well managed. This is illustrated in SSA where the delivery of electricity is often compromised by government inefficiencies *(Figure 3)* [7].

Whilst initial solar systems in SSA were small and donor funded, development is now largely as a result of competitive FITs making the business case for development. As a result, the use of Public Private Partnerships (PPP) has allowed for rapid development of solar systems in the developing world. South Africa has adopted the REIPP (Renewable Energy Independent Power Producers) system whereby through a series of bidding windows with guaranteed power buy for a fixed period, private consortiums have developed various power supply installations. Completed and work-in-progress projects now total 94 representing 6535 MW installed capacity of which solar comprises 2832 MW. The balance is primarily wind which has experienced severe cost over-runs as shown in *Figure 3*. The largest solar parks in the southern hemisphere are in South Africa. The days of the 50MW plants are over. The new proposals are for plants between 400 and 700MW in size [8].

In Kenya there is a desire to reduce power costs by half within three years to 9 US¢/kW hr and have universal access by 2020 (equivalent to 5.54GW installed capacity [9]) at an estimated distribution cost alone of $1.84bn [10]. Whether this is realistic remains to be seen but due to the low power generation capacity at the moment (1200 MW) all forms of power generation are encouraged with bidding on a first come first served basis. However, the provider is guaranteed a FIT rather than being able to negotiate a full power supply agreement. Notwithstanding this, real effort is being made with Kenya having the highest global investment in geothermal capacity in 2014 followed by Turkey and Indonesia [2].

Solar Voltaic is the largest portion of renewable energy capacity that produces revenue-generating energy. There are many thousands of solar PV projects located worldwide. It is estimated that new capacity in 2014 was 38 GW giving a total global capacity of 177 GW installed. The growth in PV use is shown in *Figures 4 and 5*.

Scatec Solar in South Africa has two plants (70MW and 37MW) producing 225-million kilowatt hours a year or enough for 53 000 households. The Dreunberg project covers 225 ha and utilises a system enabling the arrays to track the sun irrespective of the terrain. This minimises civil works and environmental impact. *Figure 6* shows galvanized steel frame systems which allow the solar panels to rotate up to 90° exposing them to maximum UV rays from sunrise to sunset [11].

The largest PV plant in the Southern hemisphere was commissioned in March 17th 2016. The 175MW plant is located in De Aar in South Africa and covers 473 ha with 503 942 solar panels and was

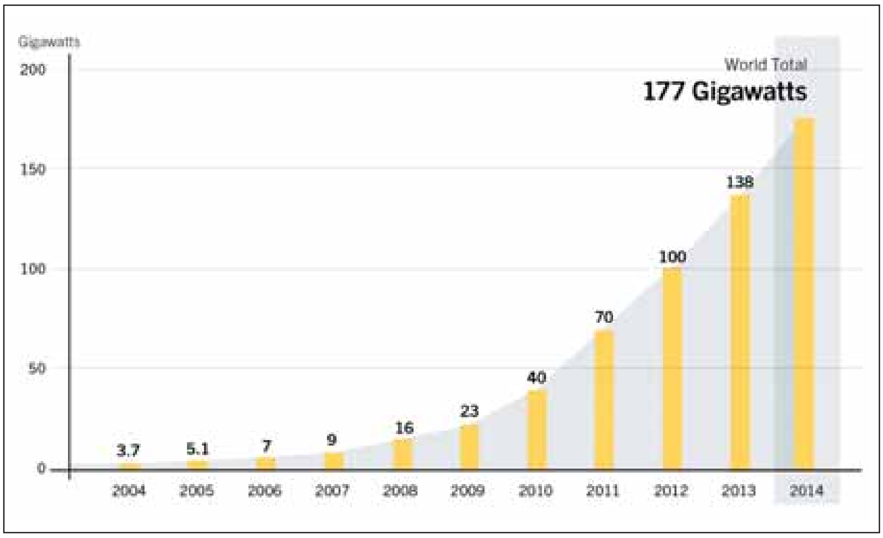
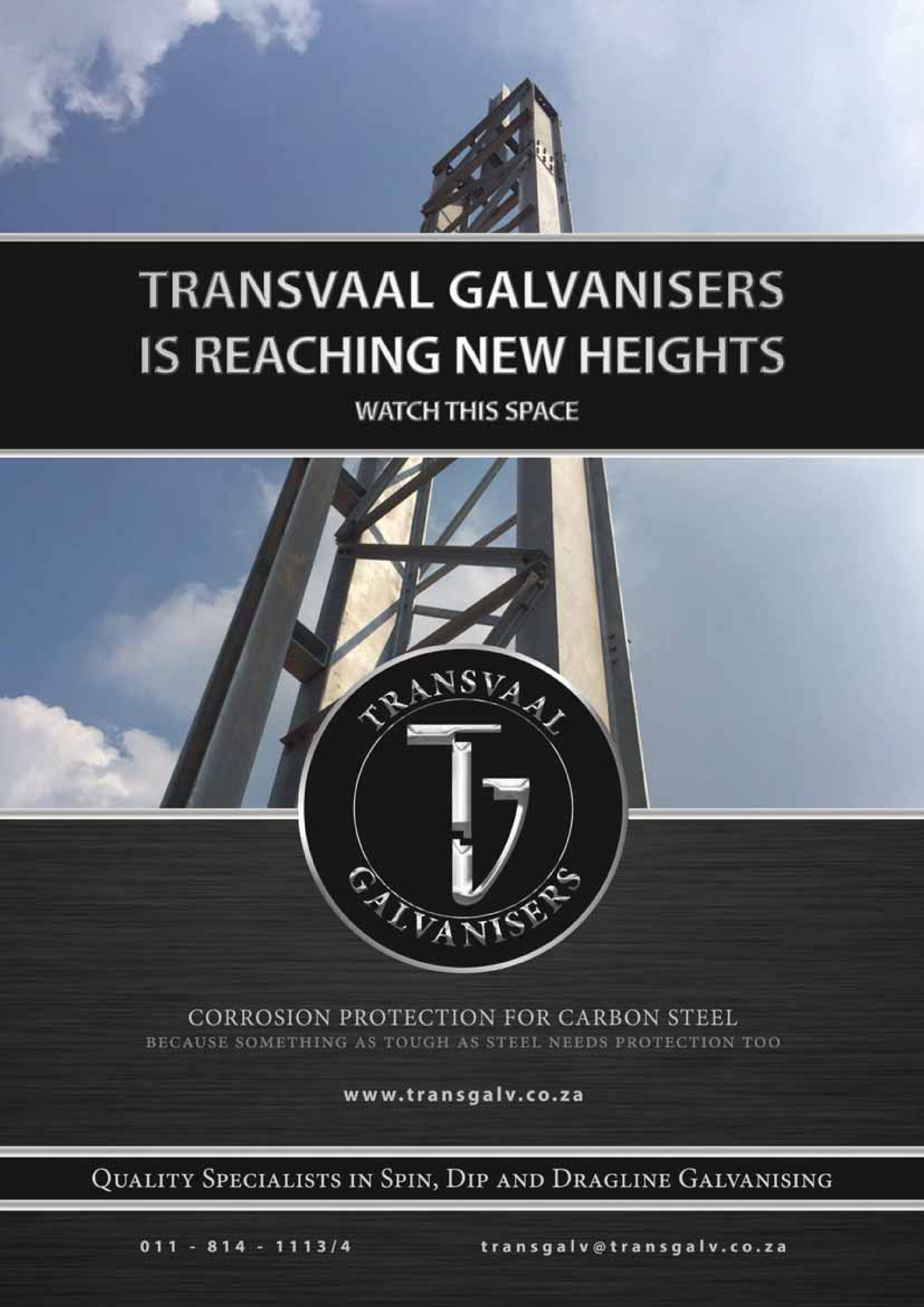


Figure 4: Solar PV, Global Capacity 2004 to 2014 [2].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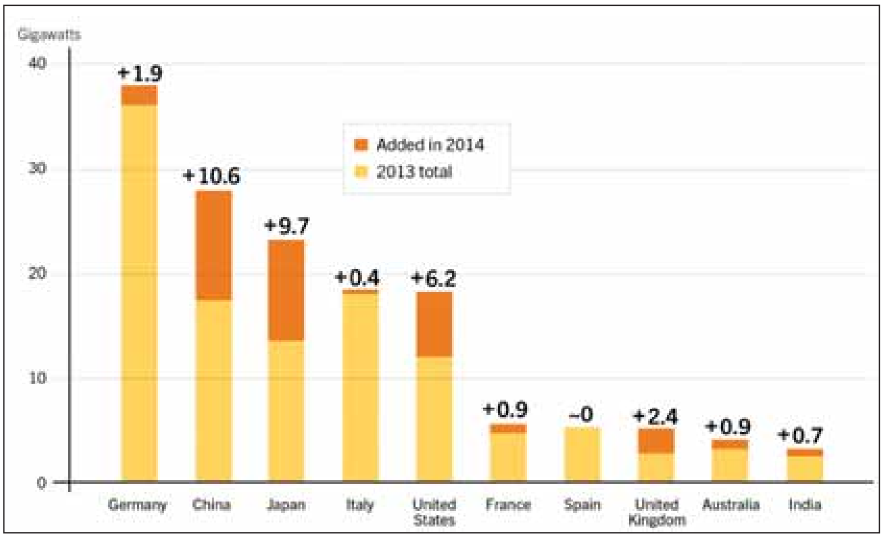

Figure 5: Top 10 countries in terms of PV capacity installed [2].

completed in 28 months. The Northern Cape of South Africa has some of the highest irradiation levels in the world, with the location of this facility boasting 2 168kWh/m^2. The total tonnage of galvanized steel was in excess of 15 000 tonnes and the total cost of the installation was US$440m.

Concentrated Solar Power or CSP systems work through focusing a large area of sunlight onto a small area. Two types of solar systems are common, the heliostat comprising a series of mirrors which focus sunlight onto a tower and the trough system where parabolic mirrors concentrate light onto a trough (containing a flowing liquid) in the focal plane. In the former electric power is produced by concentrating solar energy toward a tower that typically contains a molten salt circulation loop. The heat of the molten salt is generally used to generate steam and drive turbines as shown in *Figure 7*.

The largest new investments are in Africa with Morocco and South Africa having the most global activity. The technology is developing rapidly but capacity is only a fraction of that of PV.

Figure 6: System allowing for solar tracking with terrain irregularities. Galvanized steel rotating supports [10].

In general CSP projects use around 100 tonnes of galvanized steel per MW of power generated. The familiarity of contractors with general galvanized structurals, together with their known capabilities for corrosion resistance in typical CSP locations where corrosion severities do not exceed ISO 9223 Class 3, are important factors in the choice of galvanized steel. The ease of fabrication, including cutting, welding and resistance of the coating to damage in contrast with painted articles, favours galvanized steel. The galvanic compatibility of galvanized fasteners with galvanized structurals is preferred over their use with aluminium structurals. All CSP plants have tracking capability to ensure that the rays are focused to one point. Improved tracker systems have enabled most mid-latitude PV plants to adopt tracker technology [12].

Khi Solar One in South Africa is a 50 MW utility-scale CSP plant built by Abengoa near the town of Upington in the Northern Cape Province of South Africa. The tower is 205 meters tall and uses more than 4 000 latest generation heliostats (ASUP 140) installed over an area of around 300 hectares.

Consider the following in terms of the market potential. The biennial Africa Zinc Market Survey has shown the growing importance of the renewables industry for general galvanizing in SSA [13]. For many years, the mining industry has provided a significant market share for general galvanizing. However, with the fall in commodity prices, many projects have been shelved or cancelled. It is interesting to see how the markets compare in terms of galvanizing usage.

Over the years, the largest investments in deep level mines would have resulted in significant galvanized steel usage. An average figure for a surface plant can be in the order of 7 000 tonnes of structural steelwork. A shallow shaft may use 2 500 tonnes of structural steelwork with a deep level mine using potentially 4 000+ tonnes of steelwork. Galvanized steel is commonly used in southern Africa mine shafts and has been the subject of numerous papers. Thus, it can be estimated that a new mine would consume up to 5 000+ tonnes of galvanized steelwork.

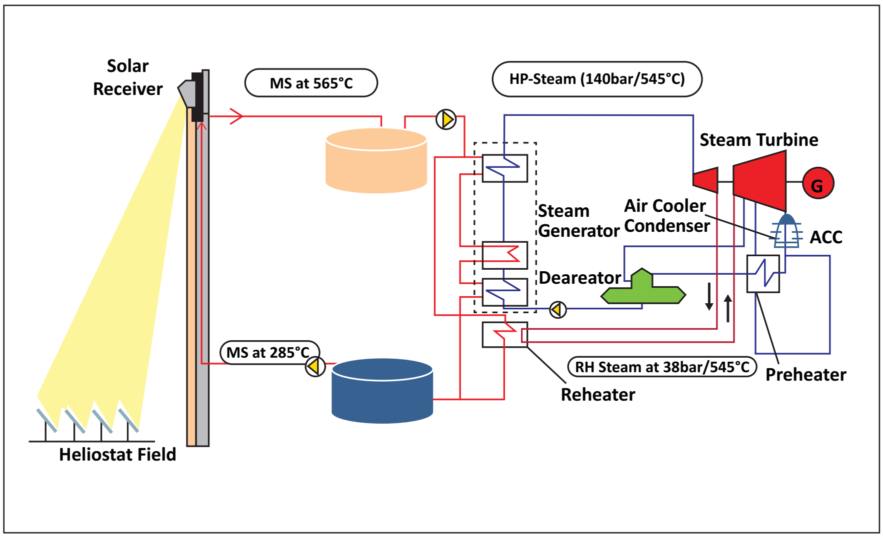

Figure 7: Typical schematic layout of CSP system.

CSP and PV plants rely on array structures which are now almost always galvanized. Estimates vary but, the average steel use is 100kg/kW or 100 t/MW. An average steel thickness is of the order of 4mm. It is easily seen that the typical solar plants of 50 MW will be using 5 000 tonnes of galvanized steel. In particular:

1. The solar business is the key to the future growth of the galvanizing industry globally. The installations will be significantly more numerous than new mines probably by an order of magnitude, easily explaining the statistics in the African Zinc Market Reports.
2. Generally, galvanizing has to compete aggressively against organic coatings in structural steel use. There is often a clear preference for large welded structures where galvanizing requires either Meccano structures or careful preparation of weld areas and subsequent repair of the galvanizing. In comparison, typical lengths for solar parts are less than 6m and they have to be transported to site anyway prior to installation so galvanizing offers the perfect solution.

Figure 8 is a market estimate based upon the considerations above and demonstrates why galvanizers should take advantage of this relatively new industry as a key market for their services.

It must be borne in mind that as solar power systems become more standardized, many of the key steel producers now promote the use of continuous-metal-coated systems. The degree of competition that these materials pose to general galvanizing depends upon the sophistication of the region and the remoteness of the location. General galvanized structurals have certainly come

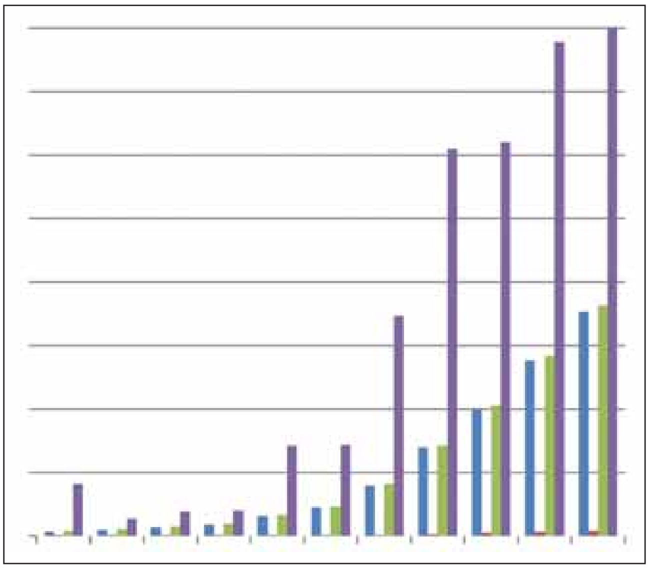

Figure 8: Installed and new capacity of solar plants and concomitant galvanized steel opportunity.

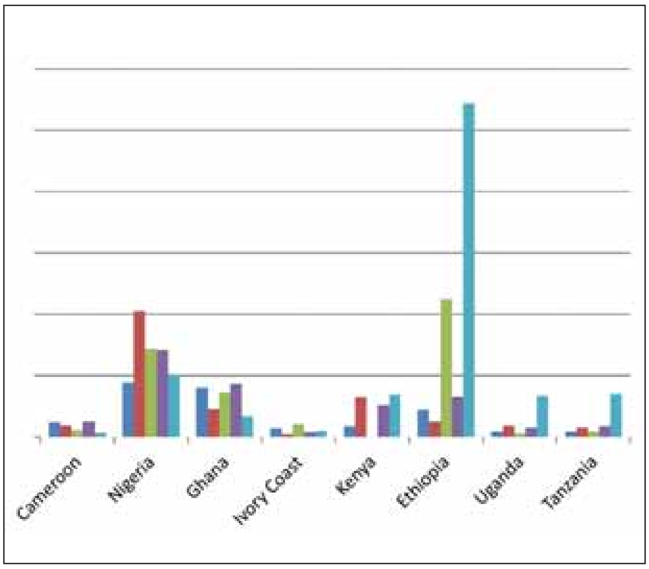

Figure 9: Importation of transmission steelwork into SSA Africa [13].

under pressure in Europe and the USA. However, Africa, South America and Asia remain markets where greater use is made of general galvanizing. Whether this situation prevails will depend upon a series of circumstances including who offers the fundamental initial funding. It is for this reason that the general galvanizing industry should act in concert to protect what is becoming a significant market for its products. With this in mind, in South Africa specifically, JVs have been established between galvanizers and fabricators to offer a complete package to the main contractor. Local content is a growing requirement for many large projects globally, and local galvanizers should take full advantage of this.

In addition, even in remote areas galvanized steel transmission and distribution lines are required for electricity grid tie-ins. The usually quoted advantages and benefits of galvanizing are perfectly matched with the requirements for this industry namely simplicity, durability, toughness and a significant maintenance free lifespan.

A simple summary would be that the 2014 additional 42 000 MW of solar represents a 4 000 000 tonnes market! Based upon the author's analyses, this market is the largest single market for general galvanizing globally.

The author is indebted to the many associations who have provided projects details. However, special mention has to be given to those galvanizers who shared their thoughts on the ease of galvanizing solar work and the best methods of gaining the work. Thanks to Francesco Indiveri of Transvaal Galvanizers for his practical inputs.

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Hot Dip Galvanizing Awards

November 2016

The Hot Dip Galvanizers Association Southern Africa is delighted to announce that the **Hot Dip Galvanizing Awards** will be held, in Johannesburg, in the first week of **November 2016.** The Awards will showcase the Hot Dip Galvanizing industry's achievements at a gala dinner, affording our members and their technical partners the opportunity to network and discuss the future development of opportunities for hot dip galvanizing.

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The Solar Parks Project

In the determination, the Minister intends to direct the Department of Energy to design and implement a procurement process for the appointment of one or more strategic partners (the "Strategic Partner(s)") for development, financing, construction, operation and maintenance of one or more solar parks located in the Northern Cape (collectively "the Project"). The Department has provisionally identified three potential locations in the Northern Cape for the development of the Project.

The Department wishes to promote the establishment of solar technology manufacturing at one or more appropriate sites within the Northern Cape. The Strategic Partner(s) will be required to facilitate the establishment of solar technology manufacturing facilities located at one or more suitable sites in the Northern Cape, where the initial 'anchor' customer for such components will be the Project.

The process to identify the Strategic Partner(s) commenced with the invitation for interested parties to respond to the expression of interest ("the EOI"). The opportunity to submit a formal submission remained open until 20 June 2016.

Any interested party that may wish to submit a response to a request for proposals are requested to submit a response to this EOI, however, submission of an EOI response is not compulsory.

The IPP Procurement Programme

South Africa has a high level of Renewable Energy potential and presently has in place a target of 10 000 GWh of Renewable Energy. The Minister has determined that 3 725 megawatts (MW) to be generated from Renewable Energy sources is required to ensure the continued uninterrupted supply of electricity. This 3 725 MW is broadly in accordance with the capacity allocated to Renewable Energy generation in IRP 2010-2030.

This IPP Procurement Programme has been designed so as to contribute towards the target of 3 725 megawatts and towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa.

The following technologies shall be considered as qualifying technologies for selection under this IPP Procurement Programme:

- onshore wind
- concentrated solar thermal
- solar photovoltaic
- biomass solid
- biogas
- landfill gas
- small hydro

In terms of this IPP Procurement Programme, the bidders will be required to bid on tariff and the identified socio-economic development objectives of the Department. The tariff will be payable by the buyer pursuant to the PPA to be entered into between the buyer and the project company of a preferred bidder.

The generation capacity allocated to each technology is in accordance with the adjacent table and the maximum tariff that a bidder may bid for purposes of the IPP Procurement Programme is as set out in the RFP.

Each facility procured in terms of this IPP Procurement Programme will be required to achieve commercial operation by not later than the dates set out in the RFP.

TECHNOLOGY	MW
Onshore wind	1 850 MW
Concentrated solar thermal	200 MW
Solar photovoltaic	1 450 MW
Biomass	12,5 MW
Landfill gas	25 MW
Small hydro	75 MW
Small projects	100 MW

Based upon the principles of this IPP Procurement Programme, the Department intends to introduce a separate Small Projects IPP Procurement Programme for electricity generation projects of less than 5MW.

Prior to accessing the RFP, each prospective bidder shall be required to pay a non-refundable fee of R15 000 (fifteen thousand Rand) per bidder, and to complete the registration form.

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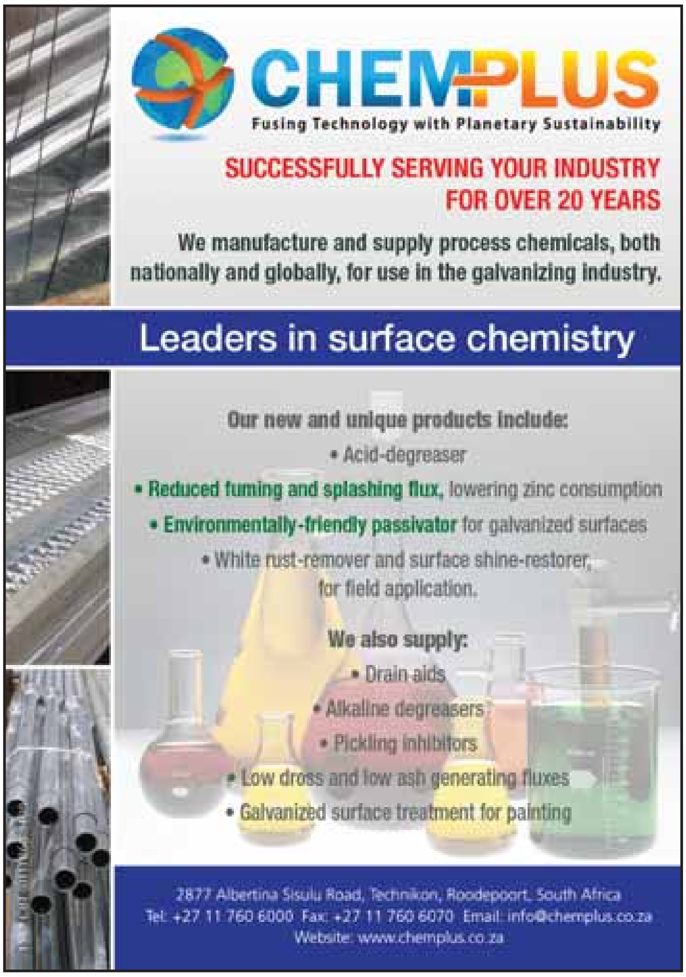
Renewable Energy Fund – Department of Energy (DoE)

Significant expansion of the South African economy during the past few decades resulted in consequent and (substantial) increased growth in electricity demand without the necessary growth in the supply side. Currently, the majority of electricity in South Africa is generated from burning fossil fuel (there is one nuclear power plant in the Eskom fleet), the South African Government has determined to source energy from the broadest spectrum of proven renewable technologies. The driver of the need for diversification in the energy mix is the Department of Energy (DoE) being the policy department within Government for energy. The South African Integrated Resource Plan (IRP), promulgated in May 2010 by the DoE, calls for an 18GW renewable energy programme over the next 20 years.

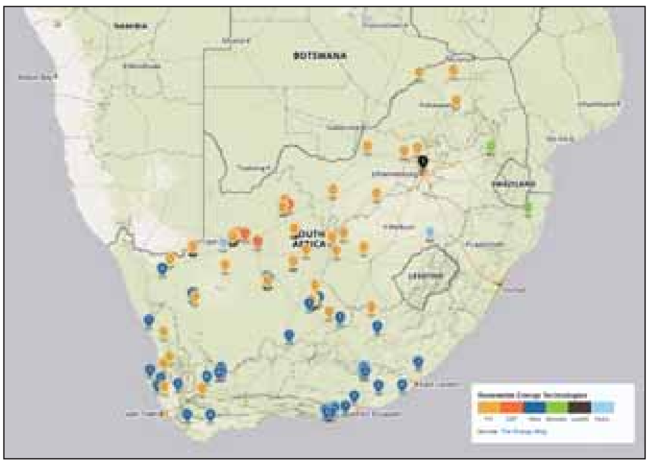
The DoE, with the support of the National Treasury, has embarked upon the creation of an enabling environment conducive for private sector investment in the energy sector as well as the procurement of the first phase of the renewable energy programme from independent power producers (IPPs). The National Treasury also supports the procurement of renewable energy through its role as lead department on public finance, which includes involvement in indirect and direct support of the programme, and through the technical advisory support that has been provided through the Public-Private Partnership (PPP) function.



During the last few months, the National Treasury has been approached by many international donor countries that would like to increase their contribution to renewable energy funding in South Africa. The establishment of a facility such as the proposed renewable energy fund is seen as one of the important steps to ensure the long-term affordability and sustainability of the renewable energy programme in South Africa. The intention of the facility is to lower the cost and impact of renewable energy on the economy by leveraging private sector investment with the more affordable climate change donor and concessionary funding under the supervision of the National Treasury and other relevant departments. The planned outcome is to have a more affordable programme which could contribute to an increased participation of renewable energy in the energy mix in South Africa. Such a funding facility could also assist in other climate change initiatives in need of affordable private sector investment as identified by government as a priority for example energy efficiency, transport and water related projects.

With its mandate to oversee national public finance arrangements, including those relating to overseas donor assistance, the National Treasury is best placed to co-ordinate the establishment of a conduit to channel possible foreign donor assistance and concessionary finance contributions into a central facility capable of disbursing funds at concessional rates to individual IPP projects in the renewable energy program as well as to ensure optimisation of such funds in the interest of South African consumers.

Furthermore, it is the intention of the Government to identify the available climate change instruments such as carbon credits, etc. and optimise the use of such facilities to the benefit of the country as part of the mix of available funding support to the renewable energy program. It will be expected of the Transaction Advisor to provide advice on these matters. The role of the National Treasury is to ensure that these funds from donors and concessionary financiers to South Africa are channelled through a well-structured and well-managed conduit into local approved mechanisms for disbursement and the proper management on receipt from donors of such funds, to the benefit of the country.



http://energy.org.za/knowledge-tools/map-south-african-generation-projects.

86 MW Prieska Solar PV project on track

Written by Sonnedix & juwi RE with edits on 13 July 2016

Aerial view of the Mulilo-Sonnedix-Prieska PV site (Image credit: Sonnedix and juwi RE)

Aerial view of a portion of the Mulilo-Sonnedix-Prieska PV project (Image credit: Sonnedix and juwi RE)

The Mulilo-Sonnedix-Prieska PV project, a 125 hectare solar PV project valued at R1.3 billion and situated 50km south-west of Prieska in the Northern Cape, is nearing completion on schedule and within budget. The 86MW project, which covers an area equal to 125 football or rugby fields, will produce enough power to supply 86 000 average South African homes.

According to Farid Moucer, Sonnedix country manager, "the project will connect to the grid later this year and has an expected 20 year lifespan, which we will operate with a local team."

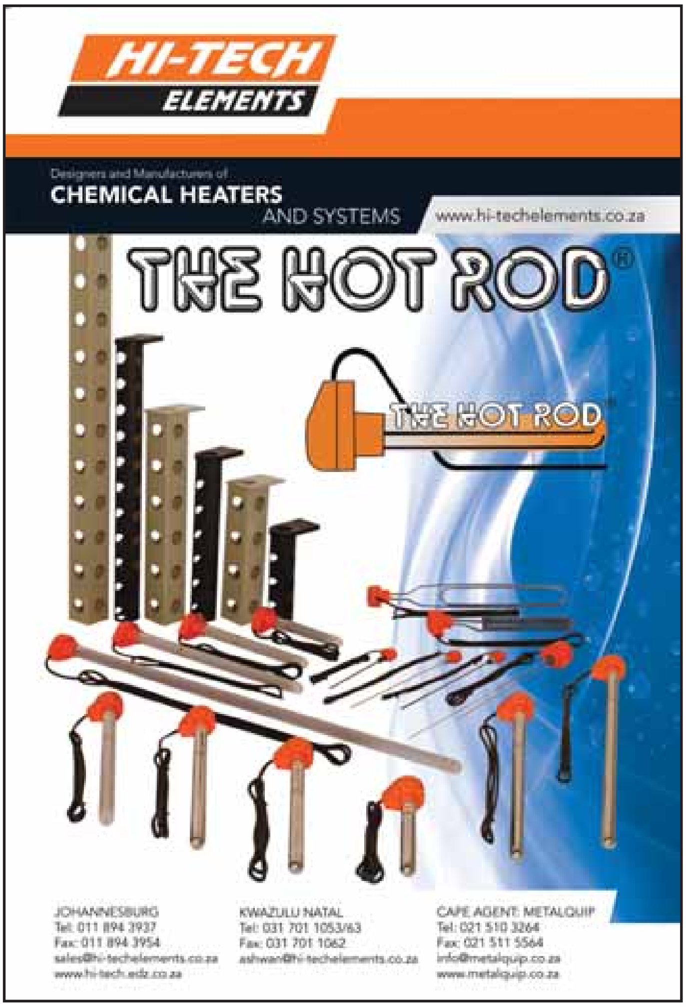
juwi Renewable Energies (Pty) Ltd, the South African subsidiary of the international juwi group, is building the Mulilo Sonnedix Prieska PV solar park in the Northern Cape Province for Independent Power Producer (IPP) Sonnedix. When complete, the 125 hectares site (approximately 2km by 1km) will comprise 275 000 PV modules, connected by 990km of cable.

"As the EPC we do the design and the engineering – we procure all of the materials and services, every single thing down to the last nut and bolt, and we put it all together on site. So we have integrated a lot of services and a lot of functionality to deliver a project that performs at a guaranteed level for the investor," said Greg Austin, MD of juwi.

The RE industry has made a considerable impact on the Northern Cape region in terms of job creation and opportunities for South African suppliers.

"For us it is important to use as many South African suppliers as possible. Most of our large equipment, solar modules, the mounting structures, the invertor station, is all procured through a local South African entity. Some of the components are imported as they are not manufactured in South Africa, but our full supply base is South African for this project," said Austin.

According to Moucer, 850 jobs have been created on the Prieska project, with over 500 of them involving people from the surrounding communities.



80 MW Noupoort Wind Farm enters commercial operation

The 80 MW Noupoort wind farm, in the Northern Cape, entered commercial operation on 11 July 2016, with all 35 turbines at the R1.9-billion facility commissioned and connected to the Eskom grid.

Country programme manager Savva Antoniadis reports that Noupoort is also the first wind farm selected during the third bid window of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to have reached the milestone, following 17 months of construction.

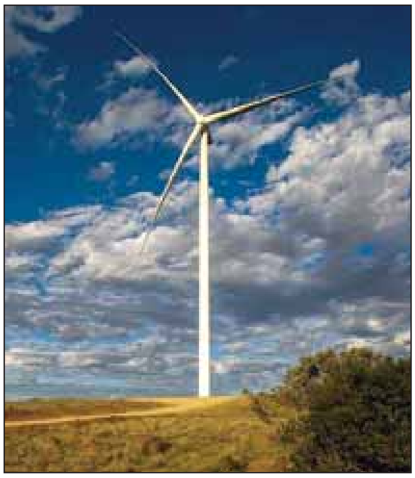
Preferred bidders for the third bid window were named in late 2013 and the projects reached financial close in December 2014, with construction of the Noupoort project having started in May 2015.

Situated in the Umsobomvu municipal area, the wind farm has been developed by a consortium that includes Lekela Power (a 60:40 joint venture between Actis and Mainstream Renewable Power), the Noupoort Renewable Energy Trust, Thebe Investment Corporation, Old Mutual's IDEAS Managed Fund, Futuregrowth Asset Management and Genesis Eco-Energy in partnership with Lereko Metier Sustainable Capital.

The 99-m-high turbines are spread across a 7 500 ha site and, once at full capacity, the wind farm is expected to produce 304 800 MWh a year.

The project brings to 15 the number of large wind farms currently in operation across South Africa, with most of the other plants situated in the Eastern Cape and Western Cape provinces.

To date, 6 377 MW of renewable energy capacity has been procured under the REIPPPP, with bids for a further 1 800 MW currently under evaluation under the so-called expedited bid window. The identities of the next round of preferred bidders should be made known within weeks.



The 80 MW Noupoort wind farm in the Northern Cape.

http://www.engineeringnews.co.za

CSP wrap-up 2016

As known to CSP industry players, South Africa CSP market has been boosted by the government's Renewable Energy Independent Power Producer Procure-ment Programme (REIPPPP) under IRP since the year of 2011. Until now 4 rounds of biddings have been launched and 600 MW of 7 CSP plants have been awarded, among which global players are devoting themselves into the desirable market. News says some 450 MW CSP projects are to be awarded for the Round 4.5 launched in July 2015, and 7 CSP projects are joining the bidding.

REIPPPP	Awarded Time	Total Capacity (MW)	Project Name	Project Capacity (MW)	Technology	Developer/Owner	EPC	Status	Location
Round 1	Dec. 2011	150	Kaxu Solar One	100	Parabolic Trough	Abengoa/IDC	Abeinsa	Operational	Pofadder, Northern Cape
			Khi Solar One	50	Tower	Abengoa/IDC	Abener-Teyma	Operational	Upington, Northern Cape
Round 2	May. 2012	50	Bokpoort	50	Parabolic Trough	ACWA	Acciona/Sener/TSK	Operational	Groblershoop, Northern Cape
Round 3	Oct. 2013	200	Xina Solar One	100	Parabolic Trough	Abengoa/IDC		Construction	Pofadder, Northern Cape
			Ilanga 1	100	Parabolic Trough	Emvelo/Cobra	Cobra	Construction	Upington, Northern Cape
Round 3.5	Nov. 2014	200	Kathu	100	Parabolic Trough	ENGIE	Acciona/Sener	Construction	
			Redstone	100	Tower	SolarReserve/ACWA	Tecnicas Reunidas/TSK	Construction	

Project Name	Project Capacity (MW)	Technology	Developer/Owner	Location
Kotulo Tsatsi	150	Tower	SolarReserve/ENGIE	Northern Cape
Rooipunt	150	Tower	SolarReserve/ENGIE	Northern Cape
Kalkaar	150	Tower	SolarReserve/ENGIE	
Solis I	150	Tower	BrightSource	Van Roois Vley, Northern Cape
	150		ACWA	Northern Cape
*Predictions say 4 projects with around 150MW per will be finally awarded.				

Project Name	Project Capacity (MW)	Technology	Developer/Owner	Status	Location
TA Helio100	0.1	Tower		Construction	
Kiwano Solar Plant	100	Tower	Eskom	Development	Upington, Northern Cape
Khunab	100		Abengoa	Planning	
Paulputs	200		Abengoa	Planning	
Kalahari	100		Engie	Planning	
Solis II	125	Tower	BrightSource	Planning	
Ilanga II	100	Parabolic Trough	Emvelo/Cobra	Planning	
BBEnergy Eskom 150 kw Fresnel Pilot Plant	0.15	Fresnel	Eskom/BBEnergy	Operational	Rosherville, Johannesburg
Ariesfontein	100	Tower	SolarReserve	Planning	
Motsimotala Solar Farm	50	Fresnel	Afri-Devo/Ample Solar	Planning	
!Kun & Khwe Solar Farm	100	Fresnel	Afri-Devo/Ample Solar/ XK CSP Solar Energy	Planning	Kimberley, Northern Cape

To release the as-detailed-as-possible CSP projects in South Africa to those who are looking at such a hot market, CSP Focus is doing the wrap-up. Surely, any updates and make-up regarding the projects listed or others are much welcome to be noticed to CSP Focus by replying directly to csp@szwgroup.com.

Register or download materials online for CSP Focus South Africa, November 23 – 24 Johannesburg, or email csp@szwgroup.com.

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Differential aeration – a corrosion inducing mechanism that is controllable

Differential aeration or necking corrosion, as it is often referred to in this instance in Masts, Poles and Pylons, as a corrosion form which frequently occurs on partially buried steel at the interface between the buried portion and that exposed to the atmosphere. It can also occur but to a lesser degree, where steel structures are cast into concrete bases and slight shrinking of the concrete during curing results in a small gap or crevice at the interface between the steel and the concrete.

The cause of this corrosion mechanism is a depletion of oxygen where the steel surface is buried, compared with the oxygen rich atmosphere in contact with the exposed portion. The result is a corrosion cell where the steel exposed to an oxygen lean environment constitutes the anode in relation to the exposed steel which is the cathode.

This form of corrosion is frequently observed just above ground level while it should not be confused with other corrosive conditions associated with the presence of corrosion inducing substances in some soils.

Perhaps the best example of corrosion brought about by differential aeration is the street lighting pole, the base of which is normally buried in soil. There is a misconception that the reason for the corrosion of street light poles can be attributed to man's best friend who sniffs and raises a leg at every pole that he passes. While this canine custom does contribute to the corrosion problem, it is not the root cause.

A paint film extending some 200 – 300mm above and below the ground level will prevent differential aeration.

What then is the solution? Corrosion which is brought about by differential aeration is prevented entirely, simply by applying a paint coating onto the buried portion of a hot dip galvanized structure, prior to erection. The paint film should extend to about 300mm above ground level. Coal tar epoxy has proved to be singularly effective for this purpose while the surrounding compacted soil ensures that the paint coating is not disturbed after erection.

An additional benefit obtained from this duplex concept is the enhanced protection from normal corrosion attack in aggressive soils.

Municipal engineers have adopted this procedure over the years with outstanding results. Hot dip galvanizing has become the generally accepted method of corrosion control for lighting masts and poles. With the added protection of a duplex coating on the buried section, it would seem that the major cause of damage to these structures can now be attributed to errant and perhaps inebriated motorists. As an alternative to painting, some pole manufacturers have added a steel sleeve in

Differential aeration may also be prevented by an additional steel sleeve situated above and below the ground level.

this area, clearly providing a double layer of steel, resulting in an extended maintenance free life of the pole.

Eskom is an organization that has over the years, thoroughly researched the various causes of corrosion and how best to control them. Eskom power transmission towers which spread eagle the entire country are hot dip galvanized with an expected maintenance free life of 50 years in most environments. All base legs of these galvanized towers are coated with a familiar band of coal tar epoxy at the interface between the galvanized steel and the concrete foundations.

Less effective prevention of differential aeration.

Prevention against differential aeration after erection may not have the desired long term benefit.

Cognitive biases in using hot dip galvanized steel

Cognitive biases are mental errors caused by our simplified information processing strategies. The human mind is limited in how much information it can process and in how much detail it can remember. In order to reduce our cognitive burden, we tend to take short cuts and make significant assumptions when solving a complex problem. Cognitive biases are essentially mental errors that we all have.

In considering the use of hot-dip galvanized steel, say as an alternative to painted mild steel, a 'Negativity Bias' is often apparent. In this type of bias we tend to give more weight to negative experiences than positive experiences. We'll be told of all the applications where hot-dip galvanized steel may have failed or to have caused major fabrication or construction difficulties, or apparent increased costs, but very little information on where hot-dip galvanized steel was proved to be the most appropriate material of construction over the life of the project.

Another type of bias is the so-called Interloper/Consultant bias, where we value third party consultation as objective, confirming and often without motive. Consultants generally do not want to make a mistake, so tend to revert to so-called 'standard practice' with little consideration being given to innovation and more favourable life cycle costing. This is especially true if the consultant has limited knowledge or experience of the uses of hot-dip galvanized steel.

The Neglect of Probability bias, where we disregard probability when making decisions under uncertainty, where we tend to reject new evidence that contradicts an established paradigm, (often called the Not-Invented-Here bias), where we ignore a product or solution that already exists and may have been more widely used, because its source is seen as an 'enemy' or as 'inferior' and the Bandwagon Effect, where we have a tendency to do (or believe) things because many other people do (or believe) the same.

Kahneman and Tversky (1979) developed a theory for a Planning Bias, which has much relevance to the decision to use hot-dip galvanized steel and the planning that goes with it. They found that human judgement is generally optimistic when it comes to planned action due to overconfidence and insufficient consideration being given to the probabilistic nature of the reliability of the information they use for planning. Because of this bias, according to Kahneman and Tversky, planners tend to underestimate costs, completion times and risks, but overestimate the benefits of the planned actions. The fundamental cause of this bias is the 'inside view' that planners take, where most focus is placed on the specific planned action and very little focus is given to actual outcomes of similar plans. Factors that planners perceive to lie outside the specifics of the project are ignored. It is often regrettable that the choice of hot dip galvanized falls into this category. The risks of using painted steel, such as frequent maintenance, are generally ignored.

The problem of 'authorisation imperative', where financial approval is required along the way, can compound the effect of the planning bias. This often has a direct effect of causing the planner to underestimate the costs, believing it to be easier to get forgiveness for cost overruns than to get the project canned if the project is perceived as unaffordable.

The Planning Bias has been recognised as being a major threat to project success. Reference class forecasting has been recommended as the way to counter estimating problems caused by the planning bias. In this way, conventional estimates should be benchmarked or validated against, or compared to, historical experience and past similar estimates. In this way, the appropriateness and competitiveness of the estimate are checked as well as identifying possible improvement and value-adding opportunities. The key advantage of reference class forecasting is that different metrics are used than were used in the original estimate and in this way the effects of the planning bias are minimised.

Hot dip galvanizing quality – the vital role of the inspector

The Association would like to acknowledge the advertisers and thank them for their support

The aim of Quality Assurance is to warrant the performance of all those actions that ensure an end product which complies with the purchaser's requirements, at the most economical cost and with maximum efficiency. The inspector is a vitally important member of the team executing any contract, whether it is a massive project or a small job where hot dip galvanizing is specified as the corrosion control mechanism.

QA is at times taken to mean the generation of masses of meaningless paperwork. This is totally incorrect and arises from the mistaken impression that so long as the paper work is correct, nothing else matters. The paper work is only there to record that the necessary steps in QA procedures have been taken. If these steps are carried out conscientiously then the end product will comply with the specification and standard required.

In this chain of events the inspector's role and the quality of his work must conducted in accordance with the acceptable standard; the inspectors competency in evaluating the work done against the standard is vital or else the entire QA system will fail. The degree or extent of inspection may differ, but the integrity with which the work is carried out remains the same. Only the highest standard is acceptable.

Duties and responsibilities of an inspector

Ascertaining the client's expectations.

The client is the most important person in the inspector's business life. He provides payment for services and therefore can expect to receive prompt service, co-operation and high quality work. The inspector must be professional at all times and must never distort the truth for the sake of pleasing the client. Unpleasant truths must be expressed in a tactful and helpful manner but must not be covered up. Verbal reports must be confirmed by a written report, signed by the inspector, reviewed and countersigned by his immediate superior in his organisation.

Ascertaining the main contractor's expectations

If the main contractor is the client of the inspector, then the aforementioned expectations apply. Should the inspector be employed by the purchaser, then he or she must report to the purchaser and obtain permission prior to sending a copy of the report to the galvanizer. It is in the purchaser's best interest to keep the galvanizer fully informed, since rejection will lead to reworking, causing delay in completion of the project. Bad news, like rejection, must be advised to the galvanizer as soon as possible after the inspection in order to enable corrective action to be taken and to minimise the amount of reworking. The inspector's most valuable tool is a tactful approach to ensure co-operation in taking corrective action. The power available in the inspector's authority must not be abused. Co-operation is constructive, condemnation is counter-productive.

Galvanizer's QA system

The correct manner of understanding a galvanizer's QA system is by conducting a Quality Audit. This should be done before the galvanizer is appointed. In practice, however, galvanizers are often appointed on the basis of reputation or, more frequently, on his having submitted the lowest tender. On his first visit to a galvanizer on a specific contract, the inspector should ask for the following:

- *Galvanizer's Quality Plan:* This sets out who does what and when and should include Hold Points, where work by the galvanizer cannot proceed until the work up to that stage is approved by the client's inspector. This quality plan must be approved by the engineer before work can commence.
- *Galvanizer's Programme:* This sets out, usually by bar chart, the time period to be taken to complete each stage of the contract.
- *Related specifications* such as SANS 10094 and HDGASA Codes of Practice referred to in the Project Specification.
- *Quality Control Forms* for completion by the galvanizer's Quality Control staff. After completion, copies should be made available to the client's inspector.

Relationships between various inspecting authorities

All inspectorates perform a valuable function and none is more important than the other. An order of inspection is dictated by the nature of the work, e.g. welding must come before coating and hence the inspector must complete his work before coating can start.

As in the case of the relationship between the inspector and galvanizer, amicable, professional, co-operation is far more productive and benefits all parties. A meeting between all inspectors at the commencement of a contract to resolve foreseeable challenges is recommended as a professional way to establish good relationships and establish a systematic order of working. Technical aspects should be discussed, e.g. if the welding inspector ensures that the welder removes weld slag, it will reduce controversy when the galvanizing inspector starts his work.

Communication between inspector, galvanizer and client

As stated above, the galvanizer should be advised verbally of possible rejections timeously so that he can take corrective action as soon as possible and so minimise rework and lost production time. Do not wait until a non-conformance report is written before advising the galvanizer. However, if the inspector is employed by the engineer or purchaser, he has a duty to report to his client first, should the work not comply with specification and hopefully, he will be able to report that corrective action is already being taken by the galvanizer. This, when applicable, must be included in the Non-Conformance report.

Non-conformance reports and problem areas

An inspector is not permitted to exercise discretion. If the work does not comply with the requirements of the specification, he must issue a non-conformance report. Prompt action by the inspector, together with a good relationship with the galvanizer should minimise problem areas.

The inspector has a duty to his client and no matter how good the inspector/galvanizer relationship, the client must be kept informed of sub-standard work at all times. Should an inspector consider that a defect is of a minor nature and will not impair the corrosion protection, he must report it as a deviation with an advisory to the galvanizer to apply for a concession from the engineer.

The engineer is in reality the only person authorised to grant any concession against the specification and standards employed.

Site inspection records

When visiting a site, the inspector should ensure that he has copies or a summary record of all components that have been inspected and approved as well as those which have been inspected and rejected. Rejected items must be re-inspected to ensure that rectification has been carried out.

Items not on either list must be new items to be inspected. One of the problems experienced is that items do not always carry an identification number or reference. This is a subject that should be brought up in the pre-execution meeting. It is a basic principle of Quality Assurance that components should be identifiable by the use of a unique reference number or alpha-numeric code. Even small items such as nuts and bolts should be in sacks or other suitable containers marked with an identification reference. One container can then be regarded as a "lot" and inspected on a sample basis.

The role of gathering data

For corrosion control purposes, the thickness of the coating over the steel is important for estimating the service life of the article. The SANS 121:2011 (ISO1461:2009) standard stipulates the mean coating thickness for a variety of steel substrate thicknesses against which the coating is to be evaluated. It is therefore most important that the inspector be well trained and competent in applying the requirements of the applicable standard / specification used to evaluate the coating thickness of the finished article. While in general it is accepted that a greater number of readings produce a more accurate result, the significant surface position and reference areas are just as important in determining the compliance of the coating to the standard.

The inspector should:

- calibrate the thickness meter accurately, with due allowance for the profile of the surface
- take readings as specified in SANS 121:2011 (ISO 1461:2009).

Protocol when visiting a galvanizing plant

Philosophy

The inspector must bear in mind that he is part of a team whose objective is to complete a project within the planned period of time, within budgeted costs and to a level of quality specified by the purchaser. This will only be achieved if all parties work in harmony and with professional co-operation.

An inspector's primary duty is to the client, who is probably the engineer or purchaser. The specified quality, as far as the inspector is concerned, is non-negotiable. The inspector can assist the client in meeting the project goals by attending the site promptly at the agreed time for inspection and by advising the galvanizer of problems as soon as they arise.

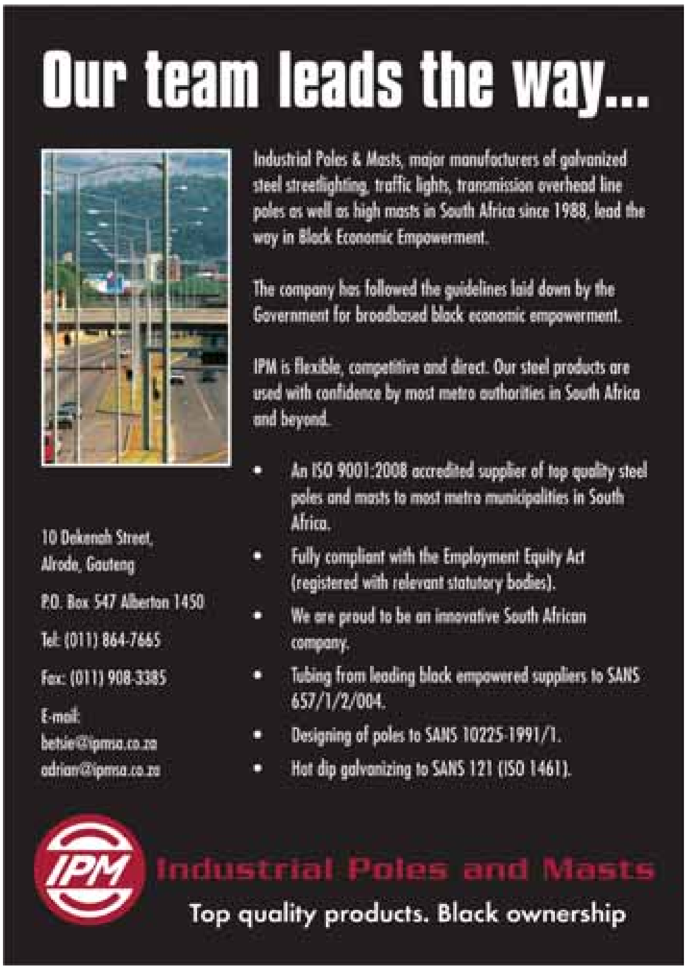
Preparation

Before visiting the site, the inspector should ensure that he or she has all the necessary documentation, background information, specifications, standards, test equipment and safety equipment to carry out the work.

Security

Before visiting a galvanizing plant, inspectors must acquaint themselves with respect to the safety and security regulations in line with the OHS Act and the plant's safety induction requirements. Due to the hazardous nature of the galvanizing process and the presence of dangerous chemicals and molten metal, inspectors are required to wear approved hard hats, safety boots or shoes, safety eyewear and refrain from entering dangerous areas without prior authorisation. Once material has been approved by the galvanizer's inspectorate, a certificate of conformance may be provided. Other mechanisms may be employed to authenticate and identify the specific galvanizer, details of which will be provided by the galvanizer.

The Hot Dip Galvanizers Association Southern Africa offers a three day comprehensive Inspectors Course that provides the inspector with all necessary tools to provide service excellence in this vital role of ensuring compliance with the standards and specifications required for excellence in Hot Dip Galvanizing. Courses are held regularly throughout the year. Further information on course content, scheduling and availability is available by calling the association or going to the website at www.hdgasa.org.za.



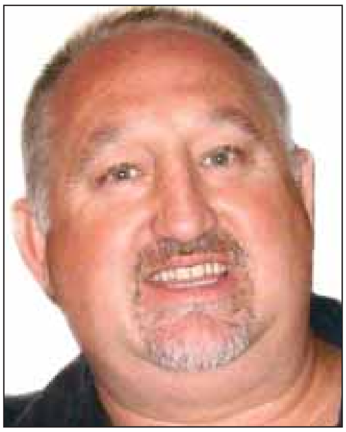
CTP Facility a tribute to co-ordinated planning

The CTP Printers rebuilt facility in EThekwini is a tribute to professional coordinated planning by Ferro Eleganza and Armco Galvanizers. Ferro Eleganza liaised closely with Armco and coordinated their efforts to ensure that the hot dipped galvanized structural steel met very exacting tolerances regarding distortion and also achieved the "architectural" finish expectations of the client.

From the outset the client, fabricator and galvanizer worked as a team to achieve the best possible results. At every phase the efforts were professionally coordinated. Ferro Eleganza ensured that the selection of steel best suited for hot dip galvanizing was made in conjunction with the steel merchant, Macsteel. Ferro Eleganza further applied best practice for fabricating of structural steel for galvanizing, in line with the HDGASA guidelines.

Armco's ongoing ISO 9001 quality management program ensured the necessary process control throughout the galvanizing process once again providing reliable, dependable and predictable results. Armco elected to cool the structural steel, after hot dip galvanizing, by using thermal blanketing and counterweight placement to ensure freedom from distortion of the structural steel elements.

The client, CTP Printers, were well pleased with the results of a superbly coordinated and well planned project which met stakeholder's expectations and complied fully with the SABS specification SANS 121:2011 (ISO 1461: 2009) standard for hot dip galvanizing. The success of this project is an endorsement of the values promoted by the HDGASA that preparation is indeed the cornerstone of success.



PERSONALITY PROFILE

ANTHONY BOTHA

What was your involvement with hot dip galvanizing and what is your vision as the HDGASA marketing manager for promoting the technology?

I have been involved with hot dip galvanizing from my earliest days as a design technician at Babcock Ames Crosta and throughout the years spanning my career both locally and internationally. My vision for marketing of hot dip galvanizing is to promote galvanizing as the top of mind technology for all built environments and positioning hot dip galvanizing as the preferred corrosion control mechanism for now and into the foreseeable future. I believe this can be achieved by educating and informing all disciplines of engineering practitioners, consultants and end users of the indisputable benefits offered by the foremost 'smart' coating available, that has proven to ensure effective low maintenance, long service life and TCO savings inherent in this technology.

You have qualifications in engineering and marketing, an unusual combination, what did you study and how did you decide to qualify in these diverse disciplines?

As a young man I initially elected to study analytical chemistry at Wits Tech after my stint in the military, but after a semester found it to be mundane. I switched to engineering which I studied part-time and achieved my National Diploma in 1984 with a merit award in 1981. After several years as a technician I moved into management and decided to study marketing part-time, I received the award for Best National Result in Statistics in 1993 and qualified with a Graduate Diploma in Marketing from the IMM in 1997.

On the engineering front what do you consider as your 'significant' achievement?

I have been involved in a broad range of engineering disciplines from structural steel to electrical reticulation and have worked as far afield as New Zealand, Germany and Poland. The building of the TOTAL Depot in Limbe Malawi was an arduous task and on completion I believe that was my significant engineering achievement.

On a personal note, tell us a bit about your family and pastimes.

I am a Jo'burg boy born, bred and raised. Married for more than 25 years, I have four children, three sons and a daughter. I matriculated at Parktown Boys High in 1977 and later served in the SADF Artillery. I love motorcycles and have been riding since 1974 and I currently ride a custom Harley Davidson 1340cc EVO chopper in a Softail frame.

Who has been the biggest influence in your life and why?

I believe that my wife, Anthea has had the biggest influence on my life. She has always supported my efforts and single handed raised our children for the two and a half years that I was involved in the project in Malawi, the majority of that time in Blantyre. Her support, encouragement and loyalty have been the bedrock on which my life has been built.

What is your philosophy of life, in a nutshell?

My philosophy of life is based on the inevitability of change. The one certainty in life is that things will change. Clem Sunter and Chantel Ilbury in their book "Mind of a Fox" best described the position of accepting that much of the future is uncertain and beyond your control; and being able to adapt your strategy and tactics as best you can to cope with it offers the best approach to living in the world beyond the 21st century.

What books do you read and what interest do you have in this regard?

I enjoy reading non-fiction by contemporary writers on all aspects of life. I have a keen interest in philosophy and engaging modern technologies. Reading is the key to living a thousand lives in one lifetime.

What dislikes do you have?

Apart from the daily nuisances of poorly behaved drivers and the arrogance of politicians my "dislikes" are always subject to self-reflection seeking to find where my self-referencing has skewed my perception regarding why I judge something as being disliked. I have a keener awareness of what I like more than what I dislike.

How would you finish the sentence "At five o' clock on a Friday, I..."

At five o'clock on a Friday, I have time to sit with my life partner, sharing a glass of beer, whisky or wine and share the thoughts, feelings, opinions of the last few days and those still to come while some soft instrumental music plays in the background. Enough dreaming, at five o'clock on a Friday I get home and start ferrying my daughter and youngest son to friends or events and then plan what has to be done around the house over the weekend.

Any last thoughts?

It is rare that outstanding results arise from one's sole efforts. In reality the excellence we seek is only achievable through synergy with others toward a common purpose. I strive to be part of a purposeful industry, through the association, that provides significant, sustainable excellence in corrosion control by meeting and exceeding the challenges of the constantly changing and developing Southern African region's market needs.

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SMT GALVANIZERS

SMT Galvanizers are specialists in the hot dip galvanizing of all types of fasteners including the treating of embrittlement on site. We do offer a wide variety of services to our clients by creating a comprehensive supply chain for all their galvanizing needs. Our expert services are procured by hand railing, flooring, construction, fabrication, civil and general engineering industries for open dipping.

All work is done according to SABS-ISO 1461SANS 121 Specifications. SMT Group is SABS and SATAS accredited and BEE compliant.

SMT Group offers the following services,

- **Hot dip galvanizing** - spinning and dipping;
- **Electroplating** - Barrel work (Yellow and trivalent blue passivating);
- **Electroplating** - Jigging up to 3.5meters;
- **De-embritteling** on site;
- **Fabrication** workshop with certified welding operators;
- **High Tech engineering workshop** - cnc milling, turning and dynamic balancing;
- **Design and building** of machines to customer requirements;
- **Supply** of electrical spares at the best prices.

SABS APPROVED

SATAS

SEESA BEE COMPLIANT

SMT GALVANIZERS SPINNING & DIPPING

SMT Galvanizers (Spinning & Dipping) | **jan@smtgroup.co.za**

SMT Electroplaters | **kevin@smtgroup.co.za**

SMT Steel (Engineering) | **bernadette@smtgroup.co.za**

CONSISTENTLY DELIVERING SUPERIOR QUALITY GALVANIZED PRODUCTS TO ALL OUR CUSTOMERS

Armco Galvanizers Isando has been operating since 1989. Geared up to accommodate heavy structural steel up and till 13m in length. Isando has an average output of plus minus 2000 tons per month. With an improved lay down area and increased loading capacity by addition of a tower crane we strive to give "A" class service to all our customers big or small.

Armco Galvanizers Randfontein is our second facility based in the Randfontein area. Randfontein has an average output of plus minus 800 tons per month and is geared up to handle light to medium structural steel up and till 6m in length.

The company has it's own SANS 121 2000 ISO 1461 accredited Hot Dip Galvanizing plants. And is listed under the SABS ISO 9001 scheme.

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ARMCO SUPERLITE

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