

Energy Management News



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Local PV modules to play a key role in the REIPPP Round 4 in South Africa

- Availability, price and quality of these components will be the major challenges for Round 4 bidders
- Enertis is performing factory quality inspections and manufacturing quality control testing in South Africa within the Sonnedix-Mulilo Prieska project

Recent allocations from the Department of Energy have made South Africa become one of the most dynamic markets worldwide, and local modules are expected to play a key role in its development.

According to Enertis, international firm specialized in providing consultancy, technical assessment and engineering services for solar projects, the South African solar market has grown into a mature industry able to create much needed energy generation capacity, local employment and a competitive renewable energy environment, attracting investment from major international players.

Recently the DoE has taken a stand to face the energy supply crisis and boosted the allocation of RE projects. When talking about Solar PV alone, Enertis highlights that if rounds 1 to 3 resulted in the allocation of 1,484MW, only in round 4 some additional 813MW have been selected. On top of that an accelerated, or expedited, round has been announced which will secure further 1,800 MW from various technologies ahead of the next-to-come round 5.

The evolution of the REIPPP has followed a path where projects selected have grown in size (75 MW projects are now the norm whereas almost 50% of the projects in Round

1 were comprised between 5 and 20 MW) and become very competitive in terms of price and local content. Round 4 prices have reached some of the lowest levels hitherto seen worldwide, and local content values are in average higher than 64%.

Just as Enertis did three years ago, international PV modules manufacturers also moved to South Africa recognizing the potential of the market. ARTsolar, Jinko Solar, ILB Helios and JA Solar have opened (or are about to) their doors recently. French Tenesol were already established in Cape Town to be later acquired by American Sunpower, with plans of increasing their production capacity in 2015. Claimed annual production capacities of these manufacturers vary from 80 to 160MW in most of the cases, so total combined capacity may still be far from the 813MW – not to forget this figure is only nominal power - necessary for Round 4 unless further expansions are made.

Preferred bidders have committed to local content values which would hardly be met if not using local manufactured modules. Most of the cost of manufacturing a PV module in South Africa is still of foreign origin but considering the local content targets, every little counts. On the other hand, project prices have become so low that to reach financial closure equip-

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ment cost will have to decrease dramatically, putting local manufacturers in a difficult position. It might be hard to meet market needs considering the current production costs, especially when some of the local manufacturers are still in the ramp-up process.

In Enertis' opinion, the future performance of the PV plants operating across South Africa depends on several factors – adequate planning and engineering, correct construction and operation of the assets, good selection of equipment - but one of the most critical components, if not the most, is still the PV modules. It is absolutely essential for the success of a project that the PV panels are correctly selected, inspected, installed and monitored during the whole life of the plants. The interests of every part involved in a project, whether it is the bank, the developer, the EPC contractor or the operator, are in the same boat when it comes to module performance. Should a major problem occur with the modules performance, none of those parties will meet their targets and economic losses will be difficult to minimize.

The PV modules technology is well proven and experience in other markets makes things easier now. Well known and recognized manufacturers have moved to South Africa bringing a significant amount of know-how and transfer of skills. However, entire factories are being built, dozens of complex pieces of equipment installed, hundreds of people trained, and quality control systems and practices put in place. To cap it all, the timelines, production and price levels demanded by the local industry these days do not make it any easier for local manufacturers to achieve maximum quality standards.

As it happens in other more mature manufacturing markets such as China, it is essential to perform a thorough due diligence when purchasing PV panels. An adequate quality control of the modules supply during manufacturing is showing great results in major markets, as it reduces greatly the risks during the entire life of the plant.

Vendor qualification, contract negotiation – introducing adequate criteria for acceptance and rejection of lots - factory auditing prior to and during construction, as well as contrast verification testing of samples in an independent laboratory are the main steps to be taken for carrying out a quality control that can help to maximize the project



return and profitability.

As local manufacturers go through this process the result is an improvement of the quality of the product, as they are pushed to improve their systems and correct any production deficiencies. Not only the major developers are benefited from this improvement but also small scale and embedded generation users.

Enertis is a pioneering company in defining quality assurance programs for photovoltaic projects. Since 2007, the company has advised clients on acquisitions of modules totalizing over 600 MW and has tested more than 16 000 modules from over 40 different manufacturers in its conventional and mobile laboratories.

The company, which has a permanent technical team in South Africa, conducts module testing in its laboratory in Port Elizabeth – Flash-test, Electroluminescence or Electrical Insulation, among others -, manufacturing audits at the PV module factories, testing services directly at the plants and advice in PV panels supply contract negotiation.

Enertis is currently performing Factory inspections and independent Quality Control testing in South Africa within the Round 3 Sonnedix-Mulilo Prieska project, and providing laboratory and on-site testing services to a number of major developers and EPC contractors involved in Rounds 1 and 2, as well as to other installers involved in the rooftop market.

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South African natural gas company makes clear its intention to contribute to the gas procurement programme in South Africa

EnergyNet) was delighted to announce specialised natural gas company Delta Natural Gas (DNG) as Forum Sponsor of the South Africa: Gas Options (SA:GO) investors' briefing.

Taking place from 28-30th September at the Mount Nelson Hotel in Cape Town, this closed forum welcomed those responding to the recent gas to power procurement programme RFI and is held with the full support of the Department of Energy's IPP Office.

In response to Delta Natural Gas' support of the meeting, EnergyNet's Damon Thompson noted, 'The fact Delta Natural Gas has such experience in the sector as well as being a South African owned company reinforces their relevance to this programme and we are delighted to be working closely with them on this meeting, which has taken nearly two years for EnergyNet to develop for the IPP Office.'

DNG commented, 'We have chosen to support SA:GO because we believe this conference is timely and

will bring together the most important stakeholders in the industry in dialogue with Government. The involvement of the IPP Office will ensure that opinions and expertise are aired in order to best contribute to a Government policy that reflects both commercial realities and practical solutions to develop a gas to power industry that is also internationally competitive.'

During the meeting the Department of Energy's IPP Office presented a timeline of actions for investors as well as examined the commercial opportunities for businesses developing gas-to-power and infrastructure projects.

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Launch of Oxfam's discussion paper

Oxfam launched a discussion paper in Cape Town on 31 July 2015 titled: "Is South Africa operating in a safe and just space?"

The discussion paper brings together the two challenges of development and environmental sustainability, based on the concept of planetary and social boundaries. The paper is relevant in South Africa as the country faces the challenge of charting an inclusive and sustainable development pathway towards 2030, and beyond to 2050. South Africa is particularly challenged by extreme inequality and the legacy of apartheid which gives even greater urgency to addressing development in an inclusive way. As one of the most water scarce and carbon intensive countries in the world, sustainability is a growing concern.

The paper applies the doughnut framework with indicators to key attributes, such as access to water, energy and food security, providing an analysis of which have been met, underachieved or overstepped.

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Fossil fuels in South Africa – what factors will drive future use?

ELECTRICITY, COP21, ENERGY SECURITY, EMISSIONS, GROWTH, TRANSPORT, ENVIRONMENTAL IMPACT – CAN SOCIETY FIND A SUSTAINABLE SOLUTION?

South Africa has already had over six years of constrained electricity supply and has probably another ten to go. It is also a country blessed with natural resources and these must be factored into future energy plans to arrive at an optimal mix of technologies that will drive South Africa's growth path out of the current constrained outlook. One of the natural resources at the disposal of the energy planners is coal, a fossil fuel with a proud history but troubled outlook. Then there are promises of gas reserves and options to import gas and liquid fuels from foreign shores. Is there a future for fossil fuels in South Africa in the context of electricity constraints, global climate change agreements, economic stagnation and environmental impacts? The Fossil Fuel Foundation (FFF) will host a conference on 8 October, dedicated to addressing this question by bringing together experts from diverse fields and focussing them on one key question – what is the future for fossil fuels in South Africa?

There are expectations for some sort of global agreement on greenhouse gas emissions reductions at the United Nations COP 21 meeting in Paris in late 2015. South Africa is currently determining its own contribution to the global reductions, in the form of its Intended Nationally Determined Contribution (INDC), for submission in early October 2015. At this stage the draft proposal is one in which South Africa would commit to emissions of about 400 million tonnes in 2050, against a Business as Usual amount of 1 600 million tonnes. This will clearly put pressures on the medium and long term use of coal, oil and gas.

Conference objectives

- To inform delegates of the key issues associated with the prolonged use of fossil fuels in South Africa
- To highlight some of the key steps that can be taken to mitigate their use if it is decided they are the best

option to drive a developmental and growth agenda.

- To provide insightful input to energy planners who are seeking to balance the requirements of society, the economy and the environment.
- Ultimately to reach a conclusion as to the future of fossil fuel's role in providing the primary energy input into South Africa's future electricity requirements.

Topics

The agenda for the day will be built around the following key areas:

What are the problems associated with fossil fuel use?

Air Quality - CO₂, SO_x, NO_x, Particulates

Water – Use, waste, treatment, impact on ecosystems

Land – Flora and Fauna impacts

Mining and its associated influence

Externalities associated with fossil fuels – are there externalities associated with the alternatives that must also be factored in?

What can be done to integrate fossil fuels into sustainable energy solutions?

Electric Vehicles/Transportation?

Energy Storage?

Carbon Capture and Storage and other Clean Coal Technologies.

Life extension of Eskom's fleet. Will there be a coal 3?

So what must policy drafters make of all of this?

Where are we with the IRP – the IRP 2010, 2013, 2015?

Is there space for all participants? Wind, solar, nuclear, fossil fuels? In what timeframe?

The electricity supply and demand outlook for South Africa to 2030.

What should South Africa Commit to at COP 21?

The outlook beyond for electricity 2030 to 2050

Targetted speakers

Brian Molefe, acting CEO, Eskom

Mark Cutifani, Anglo American

Bobby Godsel

Saliem Fakir

Philip Lloyd,

Rob Adams

Frans Cronje

Roger Baxter

Trevor Manuel

Rob Davis

The Departments of Energy, Public Enterprises, Environmental Affairs, National Treasury

Who should attend

- Decision makers and Leaders in the energy industry
- Policy makers in Government and the Private Sector
- Business people whose company's success is linked to electricity pricing and supply
- Electricity researchers, planners and strategists.

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First half of 2015 sees financial benefits from renewable energy with huge cost savings

A second independent study by the Council for Scientific and Industrial Research (CSIR) found that renewable energy from South Africa's first wind and solar (photovoltaic) projects created R4 billion more financial benefits to the country than they cost during the first six months of 2015.

The study is an update and continuation of an initial study that was published in January this year, which covered the calendar year 2014. The benefits earned were two-fold.

The first benefit, derived from diesel and coal fuel cost savings, is pinned at R3.6 billion. This is because 2.0 TWh (terawatt-hours) of wind and solar energy replaced the electricity that would have otherwise been generated from diesel and coal (1.5 TWh from diesel-fired open-cycled gas turbines and 0.5 TWh from coal power stations).

The second benefit is the saving of R4.6 billion to the economy derived from 203 hours of so-called 'unserved energy' that were avoided thanks to the contribution of the wind and solar projects. During these hours the supply situation was so tight that some customers' energy supply would have had to be curtailed ('unserved') if it had not been for the renewables. The avoidance of unserved energy cumulated into the effect that during 15 days from January to June 2015 load shedding was avoided entirely, delayed, or a higher stage of load shedding prevented thanks to the contribution of the wind and PV projects.

These direct cash savings on fuel spending to Eskom and the macroeconomic benefits of having avoided 'unserved energy' are countered by the tariff payments to the independent power producers of the first wind and photovoltaic (PV) projects. They amounted to R4.3 billion from January to June 2015. Therefore, renewables contributed a total net benefit of R4 billion (or R2 per kWh of renewable energy) to the economy.



As for wind alone, these projects were cash positive for Eskom to the tune of R300 million; saving R1.5 billion in fuel payments while costing only R1.2 billion in tariff payments to IPPs.

Dr Tobias Bischof-Niemz, who heads up the CSIR's Energy Centre, explains: 'The study was based on actual hourly production data for the different supply categories of the South African power system (e.g. coal, diesel, wind, PV). We've developed a methodology at the CSIR Energy Centre to determine whether at any given hour of the year, renewables have replaced coal or diesel generators, or whether they have even prevented so-called 'unserved energy''

This CSIR methodology was fed with cost assumptions from publicly available sources, such as Eskom's 2015 financial results for coal and diesel costs, or the Department of Energy's publications on the average tariffs of the first renewables projects, or the Integrated Resource Plan on the cost of unserved energy.

Because the study is an 'outside-in' analysis of the system operations, con-

servative assumptions for the system effects and for the costs of coal were chosen. The actual cost savings that renewable energy sources brought during the first six months of 2015 are therefore presumably higher than shown by the study.

'Our study shows that in the first six months of 2015, the trend that started in 2014 continued and speeded up, and that renewable energy provided a huge net financial benefit to the country. Without the solar and wind projects, we would have spent significant additional amounts on diesel, and energy would have had to be 'unserved' during more than 200 additional hours from January to June 2015,' Bischof-Niemz says.

'What is more, the cost per kWh of renewable energy for new projects is now close to 80c for solar PV and between 60c - 70c for wind projects. That will keep the net financial benefits of new renewables positive, even in a future with a less constrained power system,' he says. The CSIR will continue to monitor the fuel-saving and security-of-supply benefits of renewable energy. More information and the results of this study can be obtained at the CSIR website.

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Advanced manufacturing-related RDI opportunities

A workshop was held in Pretoria on 1 July 2015, to explore various advanced manufacturing-related research, development and innovation (RDI) project opportunities open to South African industry and researchers.

FACTORIES OF THE FUTURE

The Factories of the Future Public-Private Partnership (PPP) initiative aims at helping the European Union (EU) manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by developing the necessary key enabling technologies across a broad range of sectors. It will help to meet increasing global consumer demand for greener, more customised and higher quality products through the necessary transition to a demand-driven industry with less waste and a better use of resources.

The initiative concentrates on increasing the technological basis of manufacturing through the development and integration of enabling technologies, such as innovative technologies for adaptable machines, ICT for manufacturing, and novel industrial handling of advanced materials.

Specific R&D objectives are:

- high-tech manufacturing processes, including 3D printing, nano- and microscale structuring;
- adaptive and smart manufacturing equipment and systems, including mechatronics, robotics, photonics;
- resource-efficient factory design, and data management for increased production performance;
- collaborative and mobile enterprises, networked factories linking dynamically supply chains to local production;

- human-centred manufacturing: designing the workplaces of the future; and
- customer-focused manufacturing: linking products and processes to innovative services.

INTELLIGENT MANUFACTURING SYSTEMS

The Intelligent Manufacturing Systems (IMS) Programme was conceptualised in 1980 and formalised in 1995 by several industrialised nations (Australia, Canada, Japan, Switzerland and the United States) and the European Union (EU) to find a way for manufacturers to cooperate in the emerging global paradigm where design, sub-assembly, assembly and consumers are highly distributed. It is today a multi-lateral programme that seeks to support the development of innovative and relevant manufacturing technologies.

Central to the IMS Programme is its Manufacturing Technology Platform (MTP) program for industrial RDI, which provides a global framework for research collaboration. The programme has established MTPs clustered into five thematic areas as follows.

- *Sustainable Manufacturing and Occupational Safety*: This entails the development of innovative manufacturing technologies that address worldwide resources shortages and excess environmental load to enable an environmentally benign life cycle. The focus is on the assurance of occupational safety including ergonomics and industrial disaster prevention and mitigation, particularly safety in nano-material and associated manufacturing processes.

- *Energy Efficiency*: The aim is to improve efficiency and reduce the carbon footprint in energy utilisation for manufacturing and operational processes, resulting in reduced manufacturing costs and global warming impact.
- *Key Technologies*: The focus is to develop high-impact technologies for the next generation of manufacturing including the model-based enterprise, nanotechnology, additive manufacturing, smart materials and innovative process and production technologies.
- *Standards and Interoperability*: This platform focuses on manufacturing research issues that can benefit from standardisation to create open manufacturing and product standards that are accessible to everyone and enhance innovation globally.
- *Education*: Educational and vocational training programs are designed for the emerging information-based knowledge worker environment, contributing to a holistic and comprehensive vision of manufacturing education and vocational training.

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African power utility sector shines bright about the outlook ahead: PwC report

Fifty one senior power and utility sector executives from 15 African countries took part in PwC's Africa power & utilities survey.

- Survey finds companies and sector stakeholders optimistic about a range of key African electricity issues.
- 96% say there is a medium or high probability that load shedding will be the exception rather than the norm by 2025.
- Technological change expected to transform prospects for rural electrification.
- Business model transformation lies ahead for many power utility companies.

Power utility companies and stakeholders across Africa anticipate a brighter and different outlook for the sector in the decade ahead, according to a new report from PwC. Fifty one senior power and utility sector executives from 15 African countries took part in PwC's Africa power & utilities survey. They report continued concern about some of the immediate risks to the power system, but are also optimistic about the longer term prospects for electricity in Africa.

Two thirds (67%) of those we interviewed cited ageing or badly maintained infrastructure as a high or very high concern. Encouragingly, many felt this situation would improve, with only 39 per cent predicting that it would be a similarly high or very high concern in five years' time. And looking ahead to 2025, they anticipate definite step changes in a number of key issues:

- An overwhelming majority (96%) say there is a medium or high probability that load shedding will be the exception rather than the norm by 2025.
- Indeed, nearly three quarters (72%) are confident enough to rate that scenario as a high probability.
- 94% say there is a medium or high probability that, by 2025, the challenge of finding a market design that can balance investment, affordability and access issues will have

been largely solved.

- 70% expect cross border electricity flows to be significant by 2025, accounting for a third or more of electricity generated.

Angeli Hoekstra, Africa Power & Utility Leader, PwC, said:

There is much to be optimistic about and the results point the way to improvements ahead. But security of electricity supply and cost reflective tariffs continue to be the number one challenges. Until they are resolved, power systems will remain stretched, as investments in the power sector will be limited. Addressing cost reflective tariffs while ensuring social equity is a key challenge.

The survey also highlights the energy transformation that is taking place, as the market vision for the future will be a mixture of large scale centralised generation and local mini grid and off-grid distributed generation according to the fast majority of survey participants (83%).

This is supported by that seventy per cent of the survey respondents believe there is a medium to high probability that advances and cost reductions in green renewable off-grid technology will deliver an exponential increase in rural electrification levels by 2025.

And there is consensus that power companies will need to change their

business models to respond to energy transformation. Eighty eight per cent expect that future power utility business models will be transformed by 2030 with a quarter of them saying they will be unrecognisable from those operating today.

Angeli Hoekstra commented further:

Technological and regulatory change and new investments presents very exciting opportunities to increase electrification access and electricity supply. New businesses and business models will be created and Africa will leapfrog into a better and more sustainable energy future if all stakeholders in the sector, from customers to governments, new businesses, regulators and utilities will embrace the opportunity.

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The 9th Annual Africa Energy Awards recognises and rewards industry innovation and outstanding performance, and honours top power projects and influencers throughout Africa.

In 2015 we introduced the African Energy Innovation Prize, with a prize of US\$30 000. This is awarded to an individual or organisation displaying an innovative solution within the energy sector – in either the development, testing or commercialisation phase.

FIRST CATEGORY

1. African Energy Innovation Prize

The drive for success and competitive advantage, coupled with the need to satisfy spiralling energy demands across the world is what's pushing futurists and disruptors to deliver new practical energy solutions and innovations.

It is key to recognise and award these innovators. Leaders in the power and energy field are ahead of the game, combining talent and innovation with an equal capacity to realise commercial gains from their solution.

This award will focus on the many areas that equates to an innovative solution – in the development, testing and commercialization phase.

The judges will consider information and supporting documents on the following criteria:

- Rationale and strategic vision
- Innovation
- Commercial viability
- Net projected growth
- Proof of success thus far
- Scope of opportunity
- Non-financial results
- Practical applications and opportunities for use

All companies must fulfil the following general criteria for entry as well as the specific category criteria:

- Have started to trade no earlier than 1 March 2012
- Be 'independently owned'. This is defined as a business which is substantially owned by its founders and/or a group of independent investors, is not quoted on AIM or any other stock market; and is not a subsidiary or associated company of another business.
- Be African based
- Innovation in new energy sources, inventions, solutions for energy saving, energy generation, storage,

Celebrating excellence in the African power sector

The African Energy Awards 2016

transmission etc. Any and all energy related innovations

The winner will be awarded a \$30 000 prize for their contribution and innovation in the energy space.

- * African – nominees must originate from an African country
- * Nominees must be brief and include quantifiable facts when possible. No more than 300 words per criteria.

SECOND CATEGORY

2. African Energy Leader of the Year

This award will recognise a company or an individual:

A large company that has the courage and conviction to make fundamental changes, in the way they operate, changes that are disruptive and forward thinking that competitors can only follow their lead. Leadership, market growth, corporate integrity and financial success are key among the characteristics that this award will celebrate. Revolutionary thinking in implementation of best-practice safety standards, cost-efficiency and displaying a

commitment to sustainable, forward-thinking solutions are a must.

An individual that exhibits courage, dedication, vision and judgement that empowers those around him/her. A leader that is highly respected and recognised by his peers and competitors. Operational effectiveness and revenue growth will not be the deciding factors, but will play a role. Judges are looking for that 'X' factor. This is an award for an individual who has made an impact on a company level and within the industry as a whole.

The judges will consider information and supporting documents on the following criteria:

- Strategic vision
- Achievements
- Operations
- Innovation
- Financials
- Integrity
- Leadership

THIRD CATEGORY

3. Premier Energy Project of the Year

This award is about excellence in project execution and management. Eligible companies will be those which undertake a construction or infrastructure project in any part of the energy arena - electricity generation, power transmission lines and distribution facilities or renewable energy.

Judges will look for a project owner that recognized a critical need or opportunity and the quick moved to propose and finance it. The regulatory environment, challenges before and during construction as well as brining the project online in a timely fashion are key. Outstanding design qualities, delivery and execution will also be considered.

The winning project will be one that shows true innovation in its implementation and all-round approach. Project must be completed between September 2013 and December 2014.



The judges will consider information and supporting documents on the following criteria:

- Challenges
- Financial results
- Innovation
- Impact and effectiveness
- Operational excellence
- Safety
- Scope

FOURTH CATEGORY

4. Small and Medium Energy Company of the Year

Eligible companies must be a profit-seeking enterprise with less than \$50m in annual revenues.

Candidates must have developed or facilitated a disruptive solution. This award takes a closer look at the innovative developments of the company and their successful adoption or implementation as well as tangible industrial benefits.

A clear vision for the long-term future of energy and sustainability which helps shape current strategy and new initiatives is key. The company must demonstrate a commitment to furthering the industry as a whole.

The judges will consider information and supporting documents on the following criteria:

- Innovation
- Long term vision
- Impact
- Success
- Leadership

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How the meeco Group engineers its solar solutions

CHIEF TECHNICAL OFFICER THOMAS BEINDORF ABOUT THE MISSION OF BRINGING CLEAN ENERGY TO EMERGING COUNTRIES

With its wide range of competences and top-tier solar turnkey solutions, The meeco Group, a Swiss-based clean energy provider, has evolved into one of the world's leading clean energy company. Through its local subsidiaries, located all around the globe, the group achieved to create customized solar energy systems that address the requirements of varied countries and different types of customers such as businesses, communities, individuals and utilities.

The engineering of these clean energy solutions is the responsibility of meeco's Chief Technical Officer (CTO) Thomas Beindorf. The experienced expert is to date working for 30 years on the development and management of technical installations, the supervision of respective teams of engineers and workers and the installation of facilities worldwide. He has been engaged as Managing Director since 2000 in several companies of up to 450 employees. Since 2008, Thomas Beindorf has been working with meeco and is occupying the position of the CTO. As CTO, he has to streamline processes, fertilize the exchange of information and control the achievements of projects. He is in charge of steering technological processes of selecting the right components and interacts with the sales force to meet the customer requirements.

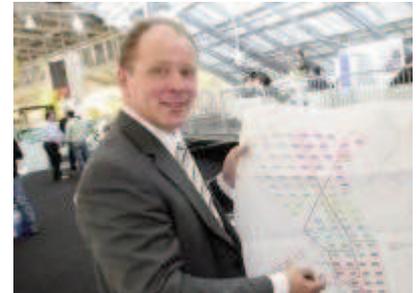
By entrenching new standards and sharing its know-how, meeco supports countries such as Pakistan, Zimbabwe or Antigua and Barbuda concerning their power supply and encourages a sustainable development. 'As meeco is mainly focused on emerging countries, (the special challenge) the company is exposed to, is caused by the different markets we are tackling', states Thomas Beindorf. 'In order to be successful in emerging markets, where the cultural background is often different and where technical standards and other benchmarks are not as defined as in

Europe, we need to train employees in our various subsidiaries. These skills are of paramount importance to generate a common understanding of the group's needs to supply the quality level of work we have to ensure and stand for.'

As meeco exclusively utilises German-engineered top-tier products for its projects, the material used for the installations benefits from a safe warranty background based on third party insurances. Being mainly present in developing countries, meeco has to adapt its products to the different climatic conditions. Thus, for every project, meeco implements tailor-made solutions, designed to meet local needs.

'Bringing solar solutions to emerging countries requires hard work and patience', explains Thomas Beindorf. 'But I strongly believe that there is no way without renewable energies and especially none without solar. New developments and innovations will decide about the competition between the several sources of renewable energies. However, solar power will stay a reliable source of energy as it is unlimited and easy to install in all sizes and at all locations.'

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African oil and gas organisations plan for an upturn in the oil price: PwC survey

Overall, activity in the oil and gas industry across the African continent has slowed in the wake of the declining oil price in late 2014.

- 93% of respondents expect a Brent crude price range of US\$50 – 80 in 2015;
- 90% of respondents expect a price range of US\$60 – 90 in 2016; and
- 87% of the respondents expect a price range of US\$60 – 90 in 2017.

Overall, activity in the oil & gas industry across the African continent has slowed in the wake of the declining oil price in late 2014. 'While the oil price has caused activity to drop, it has also served as a wake-up call to many African governments, which are working hard to pass favourable oil & gas legislation in order to attract investment into the sector,' says Chris Brendenmann, PwC Africa Oil & Gas Advisory Leader. Countries such as Kenya, South Africa and Tanzania have been taking a serious look at legislation currently in place with a view to making it more investor-friendly.

PwC's *'Africa oil & gas review, 2015'* analyses what has happened in the last 12 months in the oil & gas industry within the major and emerging African markets. As oil prices declined in 2014, the industry response has been far-reaching with significant reduction in headcount and other cost cutting measures. Capital budgets have also been cut, and frontier exploration activity has decreased. 'While response to such a drastic decline is necessary, we have seen the most successful organisations are taking time to re-set, re-strategize and plan for the upturn in prices, which will inevitably come. Africa should be no exception as many of the frontier exploration plays lie on the continent,' adds Chris Brendenmann.

As at the end of 2014, Africa has proven natural gas reserves of just under 500 trillion cubic feet (Tcf) with 90% of the continent's annual natural gas production still coming from Nigeria, Libya, Algeria and Egypt.

GROWTH AND DEVELOPMENT

The main challenges identified by organisations in the oil & gas industry have remained largely unchanged with the top three issues of uncertain regulatory framework, corruption and poor physical infrastructure also identified as the biggest challenges in 2014. Uncertain regulatory frameworks remain a concern across the industry, with over 80% of Tanzanian respondents regarding regulatory uncertainty as the top challenge facing the business. Other countries where respondents cited concern about regulatory uncertainty include Nigeria, Kenya and Angola.

The inadequacy of basic infrastructure ranked much higher in the current review than in 2013. Areas in which infrastructure remains limited are likely to see the development of existing discoveries stalled unless there is a domestic need for the resource.

Organisations identified the price of oil and natural gas as the most significant factor that would affect their companies' businesses over the next three years. 'This is not surprising given the current uncertainty around the market,'

says Chris Brendenmann. He adds: 'Fortunately industry players are looking beyond current prices when planning for the longer term.' The results of the report show that a high 90% of respondents expect the oil price to increase gradually over the next three years.

People skills and skills retention is rated the second most likely factor to impact business over the next three years. Community/social activism, instability and unstoppable political events, ranked fourth, are a noteworthy concern in the oil & gas industry. Organisations from South Africa, Mozambique, Nigeria and Kenya, in particular, expected community/social activism/instability and unstoppable political events to have a significant impact on their business.

Asset management and optimisation also remains a top strategic focus area for oil & gas companies over the next three years.

FINANCING AND INVESTING

After a rush of bidding rounds in 2014, 2015 and 2016 appear to be comparatively quiet with only a handful of bidding rounds expected. This is partly due to the flurry of bidding rounds in the previous couple of years and a consolidation of these agreements together with the lower oil price and lower interest to invest.

While it seems that the temporary meltdown is receding, African governments have shifted into gear to promulgate and ratify oil & gas regulations that are intended to encourage the monetisation of assets, while doing away with policy uncertainties.

Although merger and acquisition (M&A) activity was low in 2014/15, around one-fifth of respondents have been targeted, and a third of respondents has targeted or intends targeting companies for acquisition. This suggests that an increase in M&A activity can be expected in the near future.

Forty-one percent of E&P companies said that they would be investing in the development of drilling or exploration programmes, which is significantly lower than in 2014 when 70% reported this as a key strategic focus.

COMBATTING FRAUD AND CORRUPTION

Over 98% of organisations indicated that they have an anti-fraud and anti-corruption programme in place – of these, more than 60% believe that the programme is very effective at preventing and/or detecting fraud. Only 8% of respondents indicated that they did not have a compliance programme.

Over 43% of respondents indicated that fraud and corruption would have a severe effect on their businesses. Government officials continue to be implicated in a number of fraudulent activities across the continent. Recent research conducted by PwC shows that bribery and procurement fraud remain some of the top types of economic crimes in the broader energy, mining and utilities sectors. Despite pervasive fraud, some governments around the continent have made significant efforts to increase transparency in the industry.

SUSTAINABILITY

Under the current economic climate, oil & gas companies are looking to increasing production potential through improving efficiencies and operational excellence. In addition, they are also looking towards exploration and finding new resources as an alternative for sustainability. A vast majority of respondents (71%) reported that they will be looking at formal cost reduction measures in the next three years. In as much as businesses are considering other measures to ensure their sustainability over and above monetising natural resources, they are also expecting the

commodity price to increase in the future. And despite development in renewable and alternative sources of energy across Africa, respondents do not expect demand for these to have a significant impact on oil & gas businesses over the next three years.

REGULATORY FRAMEWORK

The presence of an uncertain regulatory framework is one of the biggest issues in developing the oil & gas business in Africa. South Africa's uncertain regulatory framework for the oil & gas industry is mainly due to unclear and overlapping mandates between the Government and state-owned companies. Furthermore, the enforcement of the Minerals and Petroleum Resources Development Act (MPRDA) has raised a number of compliance challenges in the industry, primarily resulting from new requirements directly introduced by the Act.

FIT FOR \$50

Organisations expect the Brent crude price spread to shift up over the three-year period, although, if it remains within a US\$30 band, it will be reasonably consistent. A high 93% of respondents expect a price range of US\$50 – 80 in 2015; 90% of the respondents expect a price range of US\$60 – 90 in 2016; and 87% of the respondents expect a price range of US\$60 – 90 in 2017.

The volatility and, in particular, low oil price have been highlighted as the most important factors affecting the industry, with more than 50% of E&P and non E&P companies expecting price fluctuations to have a high or very severe impact on their businesses.

Respondents are also uncertain about what to expect with acreage/licence acquisition costs. Just over a third (36%) believes acreage costs will increase, especially in Kenya and Mozambique. Respondents in developed markets such as Nigeria and Angola expect acreage costs to decrease as potential reserves valuations are affected by the oil price. Furthermore, the results of the survey show that there is an expectation that the competitive landscape is likely to undergo change, with more than 50% of respondents sharing this view.

'The oil price decline, skills shortages and uncertain regulatory frameworks have put the oil & gas industry on the African continent in dire straits. The combined effect of these challenges places an increased burden on

exploration activity and economies heavily reliant on oil & gas revenue, which may have far-reaching socio-economic impacts as a result.'

'With activity reduced, this is an ideal time for companies to address the challenges related to doing business in Africa. Strategic planning is required for continued, profitable presence on the continent. The players that emerge when the oil price rebounds are going to be agile engines that are ready to take on the market,' concludes Chris Bredenhann.

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Visiongain energy reports

1. LIQUEFIED NATURAL GAS (LNG) INFRASTRUCTURE MARKET 2015-2025

CAPEX on large-scale onshore liquefaction and regasification and prospects for leading companies

Report details

There are a number of exciting LNG liquefaction prospects around the world in 2015, both under construction and prospective. The question is whether the demand of East Asia is strong enough to support the economics of an abundant supply of liquefaction opportunities. This report tackles that question, forecasting the feasibility and likelihood of further liquefaction and regasification investment around the world. In doing so, it makes judgement calls about individual projects under construction and in planning; both in terms of the EPC costs and how likely they are to proceed. As more LNG infrastructure is constructed, an increasingly complex global LNG trade is evolving; one that is becoming ever more important to the shape of the global energy industry. Visiongain assesses that capital expenditure on the development of large-scale onshore LNG liquefaction and regasification terminals will reach \$57.3bn in 2015.

The construction of large-scale onshore liquefaction and regasification terminals is a function of the development of the global LNG industry. Investment in such infrastructure is dictated by unique supply and demand circumstances in different geographies, such as the US unconventional oil and gas boom and the future of Japanese nuclear power generation. Our report

assesses upstream asset viability, infrastructure EPC costs and demand-side outlook to anticipate the market direction.

Overall, this is a market headed for lower levels of investment in the coming years as the very large, but over budget, Australian liquefaction projects are completed.

The report is divided into two distinct global markets: expenditure on (a) liquefaction and (b) regasification facilities. These global markets are further divided by the most important spaces for infrastructure investment. Detailed tables of all in operation, under construction and planned facilities are also provided and a companies chapter examines the LNG portfolio of the leading equity shareholders of LNG capacity, as well as detailing other leading stakeholders within the industry.

This report will be of value to anyone who wants to better understand the industry and its dynamics. It will be useful for stakeholders already involved in the LNG industry, or for those wishing to understand and appreciate the trajectory and state-of-play of an industry of growing importance to the global energy industry.

How this 225 page report delivers

- Capital expenditure forecasts and analysis of onshore LNG infrastructure from 2014-2025.
- Capital expenditure forecasts for liquefaction and regasification infrastructure from 2014-2025
- 120 tables, charts, and graphs.
- Detailed tables of all large-scale onshore LNG liquefaction and regasification facilities around the world in operation, under construc-

tion and planned.

- An assessment of the viability and economics of floating liquefied natural gas (FLNG) vessels (both LNG Floating Production Storage (LNG FPSOs) and Offloading and Floating Storage and Regasification Units (FSRUs)) versus onshore terminals
- PEST analysis of the political, economic, social and technological factors affecting the market
- An exclusive interview with Cheniere Energy
- Forecasts for the leading 10 national and regional spaces where LNG infrastructure is being constructed,
- individual market outlooks for a further 9 significant countries
- Portfolio Details & Analysis of the Leading 9 Publicly Listed LNG Capacity Equity Shareholders:
- Profiles of the leading stakeholders in the LNG infrastructure industry

You will gain from our analyst's industry expertise on national and regional spaces allowing you to demonstrate your authority on how the LNG industry will develop and which countries will most influence its trajectory in the following regions:

- Australia (Liquefaction)
- Canada (Liquefaction)
- East Africa (Liquefaction)
- Russia (Liquefaction)
- South East Asia (Liquefaction)
- US (Liquefaction)
- China (Regasification)
- Europe (Regasification)
- Japan (Regasification)
- South Korea (Regasification)

And two separate 'Rest of the World' chapters for expenditure on both lique-

faction and regasification terminals. These chapters include individual market outlooks for:

- Algeria
- Angola
- Egypt
- India
- Nigeria
- Qatar
- Trinidad & Tobago
- South America
- Singapore

Our report analyses the LNG portfolios and outlook of the key publicly listed companies operating within the global LNG market, including:

- BG Group
- BP
- Cheniere Energy
- Chevron
- ConocoPhillips
- ExxonMobil
- Petronas
- Shell
- Total S.A.
- As well as profiles of the leading stakeholders in the LNG infrastructure industry.

What makes this report unique?

Visiongain consulted widely with leading industry experts and the full transcript from exclusive interview with Cheniere Energy is included in the report. Visiongain's research methodology involves an exclusive blend of primary and secondary sources providing informed analysis. This methodology allows insight into the key drivers and restraints behind market dynamics and competitive developments. The report, therefore, presents an ideal balance of qualitative analysis combined with extensive quantitative data including global, national and regional markets forecasts for capital expenditure on the expansion or new-build construction of LNG liquefaction and regasification infrastructure from 2015-2025.

2. THE 20 LEADING COMPANIES IN SHALE GAS 2015

Competitive landscape analysis

Report details

The extraction of oil and gas from shale formations is a relatively new phenomenon with commercial production only first occurring in the twenty-first century. Shale rock formations have low permeability and porosity and so require the use of horizontal drilling and hydraulic fracturing in order to extract

the hydrocarbon resources. The techniques to develop hydrocarbons from shale formations, was first pioneered in the US and gas extraction using this method significantly increased from 2007. Today the global shale oil and gas markets are dominated by the US. Nearly all of the 20 leading companies in shale gas in 2015 have large CAPEX budgets directed at shale gas development in the US.

Visiongain calculates that the 20 leading companies in shale gas in 2015 make up 78.9% of the \$34.3bn global market, showing that more than three quarters of the spending in the global shale gas market originates from just twenty major companies.

The report provides a detailed individual profile for each of the twenty leading companies in shale gas in 2015. Each profile reveals company capital expenditure on shale gas in 2014 and 2015, total company CAPEX budgets for 2014 and 2015, details of their shale gas projects and spending, tables showing company acreage in which plays, a SWOT analysis of their involvement in the shale gas market, and information of other major projects the company is involved in.

How this 164 page report delivers

- Capital expenditure information for each of the 20 leading companies detailing the CAPEX to be spent in 2015 on shale gas operations and the CAPEX spent in 2014
- Market share for leading 20 companies in the global shale gas market
- 100 tables, charts, and graphs.
- An exclusive interview with Michael Williams at Velocys.
- SWOT analysis and examination of the prospects for the leading 20 companies in the global shale gas market

Our report reveals the twenty companies of central importance to this market in terms of highest capital expenditure in the industry, with detailed company profiles for each. The profiles contain details of the company's total capital expenditure in 2014 and 2015, shale gas capital expenditure for 2014 and 2015 and market share within the shale gas market. The twenty leading companies are:

- Anadarko Petroleum Corporation
- Antero Resources Corporation
- BHP Billiton
- Chesapeake Energy
- Chevron

- ConocoPhillips
- CONSOL Energy
- Encana Corporation
- EQT Corporation
- ExxonMobil
- PetroChina (CNPC)
- Pioneer Natural Resources
- Range Resources
- Reliance Industries Limited
- Royal Dutch Shell
- Sinopec
- SM Energy
- Southwestern Energy
- Statoil
- Talisman Energy (Repsol)

What makes this report unique?

Visiongain consulted widely with leading industry experts and the full transcript from an exclusive interview with Velocys is included in the report. Visiongain's research methodology involves an exclusive blend of primary and secondary sources providing informed analysis. This methodology allows insight into the key drivers and restraints behind market dynamics and competitive developments, vances in science, biotechnology and pharma expand possibilities of medicines harnessing RNAi interference. You gain feel for those technologies' revenue prospects.

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First intra-African transaction of carbon credits in West Africa

ecosur Afrique, the leading carbon finance group in Africa, Investisseurs & Partenaires (I&P), an impact investment fund dedicated to small and medium size enterprises in Sub-Saharan Africa and Volta cars Rental Services (VRS), a car leasing company operating in West Africa, announced in mid-June the first ever carbon credits transaction involving a Seller and a Buyer from West Africa.

The transaction, which has been structured by ecosur Afrique, allows VRS customers to offset the CO₂ emissions of vehicles leased in Ghana, Côte d'Ivoire and Senegal. Thomas Crand, the co-founder of VRS, states: 'We develop a strong environmental strategy; CO₂ emissions are at the heart of our concerns and we are pleased to offer our customers the option to offset their carbon footprint. Today's transaction is pioneering and a unique choice, which distinguishes us on the West African market. We hope it will become standard in our sector. 'VRS will aggregate the offset demand of customers taking part in the 'carbon neutral' program each quarter and for the whole fleet concerned. The carbon credit purchases will be made with same periodicity.

The carbon credits, or emission reductions, which are at base of the offset transaction, are generated from the dissemination of energy efficient cook stoves in Côte d'Ivoire. The cook stoves are distributed as part of the 'Soutra Fourneau' programme financed and operated by ecosur Afrique. They allow us to reduce charcoal consumption of small entrepreneurial users such as restaurants or canteens. The use of charcoal and firewood for cooking pur-



Fabrice Le Sache, CEO of ecosur Afrique

poses remains a major source of CO₂ emissions and deforestation in West Africa. Beyond the environmental aspect, the benefits are numerous: redistribution of purchasing power to consumers, decrease of noxious fumes, and reduction of meal preparation time by half.

Fabrice Le Sache, CEO of ecosur Afrique explains the background of this pioneering transaction: 'The exchange of carbon credits involves traditionally their transfer from developing countries to industrialized countries. We are convinced that the future of the market lies in part in the development of the South / South transactions, particularly within Africa. We have been working for several years on our carbon credit offer in

order to create sufficient liquidity allowing the emergence of such a market. With over 40 projects in 17 countries, we now have the largest portfolio of African carbon credits in terms of volume and diversity. We must now increase and expand the demand; Similar CO₂ offset transactions are under negotiation with African hotel chains, carriers and agribusinesses.'

As a private investor of VRS, I&P played a major role in the operation. The fund began by offsetting its own CO₂ emissions in an exemplary manner and proposed this solution to some companies in its portfolio in the following, particularly to those, which are concerned by this topic (logistics, transport, distribution of fresh products). Jean-Michel Severino, CEO of Investisseurs & Partenaires: 'I&P shows, once again, its commitment to pioneering entrepreneurial ideas, both to strengthen the business model of its holdings, to offer them distinctive solutions in their market and to assist them in environmental and social performance, a pre-condition of economic sustainability.'

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Department of Energy, South Africa, and keynote at Argus Africa Storage and Logistics 2015 Conference

- The 2015 conference offered a pan-African platform for professionals from the liquids bulk supply chain
- The conference addresses the hurdles presented by infrastructure gaps and how investment and development can assist the flow of petroleum products across Africa

The Argus Africa Storage and Logistics 2015 was held in Durban, South Africa, on 16-17 September. The 2015 conference offered a pan-African platform for professionals from the liquids bulk supply chain to address the hurdles presented by infrastructure gaps and how investment and development can assist the flow of petroleum products across Africa.

Acting supporting partners, SAPIA (South African Petroleum Industry Association), SAOGA (South African Oil and Gas Alliance), the Walvis Bay Corridor Group and MCLI (Maputo Corridor Logistics Initiative) are helping to raise the profile of African energy infrastructure as an investment model. Bidvest Tank Terminals, TSL Logistics and Franki Africa-Keller Group were sponsors for the event.

Advisory board members and speakers consisting of commercial, scientific, industrial and municipal figureheads helped shape the structure of the two-day programme, including Tseliso Maqubela, Deputy Director-General of Petroleum Pricing and Regulation at the Department of Energy in South Africa; Mosetlho Kenamile, General Manager of Operations at Botswana Oil Limited; Michael Kariuki, Technology Manager at Kenya Petroleum Refineries; Remi Duchateau, General Manager of Operations at Total South Africa; Marijn Kuiper, Business Development Manager at Vopak; Mziwakhe Ngwane, Manager, Trading, Supply and Logistics at PetroSA; and representatives from other authorities from across the African and global liquids bulk sector.

Argus Africa Storage and Logistics 2015 expected to play host to a similar demographic as last year's event in Cape Town, South Africa; with Puma Energy, NERSA, Vivo Energy, Oiltanking Mozambique, Trafigura, Horizon Terminals, Vitol South Africa, Engen Group, Oman Trading, Fluor, International Finance Corporation, CB&I, Intertek and several high-profile storage operators, trading firms, refiners, industry associations and equipment providers arriving from Africa, Europe and the Middle East.

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Eranove embarks on hydro-electric power project in Mali

HYDRO-ELECTRIC POWER IS ONE RENEWABLE ENERGY SOURCE THAT IS IN ABUNDANT SUPPLY IN AFRICA

The Eranove Group, a major pan-African player in the electricity and water sectors, signed a 30-year concession agreement in June with the government of the Republic of Mali through its subsidiary Kenié Energie Renouvelable. Under the agreement, which is effective from the date of signing, the Group will finance, develop, build and operate the Kenié hydro-electric dam located in Baguinéda on the Niger River, 35 km east of Bamako. The signing ceremony took place in the presence of the Minister of Economy and Finance, Mamadou Diarra, the Minister of Energy and Water, Mamadou Frankaly Keïta, and the Minister of Investment Promotion and Private Sector, Mamadou Gaoussou Diarra.

This agreement represents an important step forward for the Eranove Group. The Group's managing duo of Vincent Le Guennou, Co-CEO of Emerging Capital Partners (ECP) and Chairman of the Board of Directors of the Eranove Group, and Marc Albérola, CEO of the Eranove Group, made the trip to Bamako in Mali, specifically to get the project up and running.

The signing of the concession agreement is likewise an important move for the Republic of Mali. According to World Bank estimates, the country's current installed power capacity of approximately 414 MW (1) covers only half of potential demand. The Kenié hydro-electric facility, with its installed capacity of 42 MW, will help Mali respond to this energy challenge. Initial simulations suggest that the Kenié dam could produce around 175 GWh, which is equivalent to the average annual consumption of 175 000 households (2). What is more, the structure will enable Mali to make better use of its hydro-electric potential and thus

reduce its dependence on imported hydrocarbons.

With an estimated potential of 400,000 MW (3), 'hydro-electric power is one renewable energy source that is in abundant supply in Africa. As part of the regional integration of power transmission networks, hydro-electricity can play a key role in increasing power generation capacity. And we mustn't forget micro and pico hydro-electricity either. These small hydro-electric facilities can supply power to villages or groups of villages in remote areas far away from interconnected transmission systems. Hydro-electricity is a renewable and competitive source of power in terms of production costs, and could even play a role in the financial balancing of power sectors and in meeting demand. This would prove hugely ben-

eficial both for local populations and for regional industrial development,' assesses Marc Albérola, CEO of the Eranove Group.

The signing of the concession agreement comes after several years of cooperation between the Republic of Mali's Ministry of Energy and Water and IFC InfraVentures. IFC is a member of the World Bank Group and is the largest global development institution focused exclusively on the private sector in developing countries. Working together, these institutions conducted preliminary feasibility studies followed by an international call for tenders, which resulted in the selection of the Eranove Group as a strategic partner. The agreement of 18 June 2015 is a significant milestone in the implementation of the project, as the financing of



Marc Albérola, CEO of the Eranove Group

the project – estimated at EUR 110 million – can now get under way. According to the current project schedule, construction is due to begin in 2016 and the dam would be put into operation in 2020. The dam will then be operated under a concession agreement by Kenié Energie Renouvelable, a new subsidiary of the Eranove Group, whose shareholders will also include IFC InfraVentures.

Supported by Emerging Capital Partners (ECP), a pan-African leader in private equity investment that has raised over USD 2.5 billion in assets for the continent, the Eranove Group is embarking on a new stage in its pan-African development.

In addition to its operations in Mali, the Eranove Group already has a historic presence in Senegal, through water distribution company SDE, and in Côte d'Ivoire, via electricity companies CIE and CIPREL, water distribution company SODECI and AWALE.

Operating over 1 100 MW of power generation facilities in Côte d'Ivoire, the Eranove Group currently accounts for nearly 70% of the country's installed capacity and invests in a number of projects. CIE mainly operates six hydro-electric dams generating 604 MW of power with high availability rates.

The Eranove Group has fronted and coordinated one of the biggest infrastructure investments in Côte d'Ivoire in recent years, in the form of the CIPREL power plant (EUR 343 million). After an initial phase, which began in January 2014 (a 110 MW gas turbine), the second phase (a 110 MW steam turbine) will be completed in late 2015, creating a combined-cycle plant.

1. Source: Energie du Mali
2. Source: IEA, Africa Energy Outlook 2014 – demand per household with access to electricity in West Africa = 1,000 kWh
3. Source: www.worldbank.org/en/topic/hydropower/overview

● Website: www.eranove.com

ECOWAS and Penspen sign contract for a feasibility study for the extension of the gas pipeline network in West Africa

The Economic Community of West African States (ECOWAS) and international energy services company Penspen announced the completion of contract signing in February 2015 to enable a formal start to the Feasibility Study examining the current West African Gas Pipeline (WAGP) system performance and its possible future network extension to other ECOWAS states.

The work will look at how WAGP has performed since its completion in 2010 and what measures need to be taken to optimise its operation. The work includes a technical and economic analysis of the extension of the pipeline conditions; market assessments will be made of possible ECOWAS countries to consider where network extension can be substantiated and estimates of the required investments will be made to quantify costs and benefits.

The study is planned to take 18 months and will include a number of validation workshops to review progress and study results involving Experts from ECOWAS member states and sub-regional institutions.

The kick-off meeting was held in Abuja with experts from Penspen and a team of ECOWAS headed by Mr Bayaornibe Dabire, Director of Energy, ECOWAS Commission who quoted in his opening remarks the importance of WAGP and the need for its extension as an opportunity to meet energy demand in the region.

Peter O'Sullivan, CEO of Penspen said: 'The signing of the contract for this significant study marks yet another occasion where the critical early phase abilities and experience of Penspen has been recognised by multi-nation clients. This study builds on our established work and reputation gained for other feasibility study work on major projects such as Kampala-Kigali, AGRI, TAPI and Trans Sahara'.

ECOWAS includes 15 member states covering an area of over five million one hundred (5,1) square kilometers with an estimated population of about 300 million inhabitants. WAGP at present runs from Nigeria to Benin, Togo and Ghana a total distance of 678 km with 569km offshore.



Peter O'Sullivan, CEO - Penspen

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Scatec Solar
Improving our future™

Scatec Solar to build first large scale solar plant in West Africa

MALI NOW BECOMES THE FIRST COUNTRY TO INSTALL THE LARGEST SOLAR GRID-CONNECTED POWER PLANT IN THE REGION

An historic agreement to Build-Own-and Operate West Africa's first utility-scale solar power plant was signed on 10 July by Norwegian company Scatec Solar and its partners, the Malian Ministry of Energy and Water and Electricité du Mali (EDM), the electricity utility of Mali. To be located near the ancient city of Segou in South-East Mali, 240 kms from Bamako, the 33 MW solar project is being developed in partnership with IFC InfraVentures and the local developer Africa Power 1.

Speaking on the occasion, the Malian Minister of Energy and Water, Mr. Mamadou Frankaly Keita said 'This landmark agreement signals the Government's commitment to meet the nation's growing energy demand and to provide clean, renewable and affordable energy to our people'.

The agreements include a Power Purchase Agreement (PPA) between EDM and Segou Solaire SA, the local project company controlled by Scatec Solar, for the delivery of solar power over the next 25 years. The PPA with the utility is complemented by a Concession Contract with the Government of Mali, granting license to Segou Solaire to operate.

With this PPA, Scatec strengthens its position as the leading, integrated solar IPP (Independent Power Producer) in Africa. The Oslo-headquartered company's CEO Raymond Carlsen says 'This project is another great milestone for Scatec Solar. After several years of development efforts in the region, we can now move forward with the first utility-scale solar plant in West Africa. The Malian Authorities have demonstrated decisive will to tackle the nagging issue of power supply.'

Scatec Solar ('SSO) will own 50 percent of the power plant and World Bank's project development fund, IFC InfraVentures will hold 32.5 percent, while the local project development company, Africa Power 1, headed by Dr Ibrahim Togola, will hold 17.5 percent. Scatec Solar will construct the plant, and in addition provide operation and maintenance services after the plant is connected to the grid.

'One of the pillars of the World Bank's Country Assistance Strategy for Mali is to increase access to energy, a development fundamental. IFC InfraVentures' partnership with Scatec Solar and Africa Power 1 helps advance this strategy through Scatec Segou, part of a series of renewable energy projects we are developing in the country,' said

Alain Ebobisse, Global Head of IFC InfraVentures.

Dr Ibrahim Togola, the Chairman of Africa Power 1 SA and General Administrator of Scatec Solar West Africa says: 'Today's event is historic because Mali now becomes the first country to install the largest solar grid-connected power plant in the region. This high profile joint-venture in which Malian citizens participate will serve as a model to launch the solar era in West Africa'.

Annual production from the 33 MW solar power plant is estimated to be 60 000 Megawatts hour (MWh). The ground-mounted photovoltaic (PV) solar plant will deploy approximately 130 000 PV modules on a fixed tilt system and will connect to an existing transmission line. This will provide



clean and affordable energy to a country in dire need for more power generation capacity to support further economic growth. The power generated from the plant represents five percent of Mali's total electricity consumption, equal to the electricity consumption of 60,000 households.

During the construction phase, the project will provide 200 local jobs. As part of Scatec's corporate philosophy, special emphasis will be put on transferring technical expertise to the local community.

In an era of climate change concerns, the 33 MW Segou power plant is an important initiative to reduce carbon emissions by about 46 000 tons once completed. Scatec Solar and EDM will jointly register the project with the United Nations CDM (Clean Development Mechanism) under Scatec Solar's program for solar projects in Africa.

The project with a total cost of Euro 52 million is to be financed through 45% senior project finance debt. IFC InfraVentures will arrange the Debt for a total amount of Euro 23 million. Further, the project has already been granted a concessional loan that will cover 30% of the Capex from Climate Investment Fund through the program 'Scaling Up Renewable energy in Low Income Countries Program' (SREP). The remaining 25% is provided as equity by the project partners. Financial close is expected before the end of this year.

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Global leaders gather in Addis Ababa for World Energy Council Executive Assembly

At the World Energy Council Executive Assembly in Addis Ababa on 26-29 October, discussions will focus on how Africa can grow and create development opportunities whilst also considering evolving climate policies and new resilience challenges. Already more than 20 ministers from Africa and beyond have confirmed their attendance, together with some of the most influential business and policy figures in the global energy sector.

Discussions at the Assembly will include the challenge of how to get investors and politicians to work together to find ways of overcoming the obstacles that are preventing a flow of capital to Africa, and develop its vast resources in areas such as hydropower, solar, oil and natural gas.

Christoph Frei, Secretary General World Energy Council, said: 'With a resilient energy infrastructure, cross border co-operation and investment there are energy resources which could be exploited to the benefit of African prosperity. Critical success factors are the development of technical and financial skills, the enabling of entrepreneurship and the commitment to robust and balanced policies and, in the World Energy Council's 'Year of Africa', we are calling for innovative approaches to deliver progress.'

Hydropower offers real opportunities for providing electricity in Africa where there is significant undeveloped potential with only an estimated 9% of reported hydropower resources developed to date according to the latest World Energy Council Hydropower Report. Africa is expected to be a major market for future hydropower activity – it offers the chance to bring much needed electricity supplies to regions where energy resources are scarce.

In particular, the markets of Ethiopia, Democratic Republic of Congo, Angola and Cameroon have significant undeveloped resources. Regional African co-operation bodies, including the Eastern Africa Power Pool, the Western Africa Power Pool and the Southern Africa Power Pool have the potential to drive further development of hydropower where domestic resources could be developed for export to neighbouring countries with strong demand. However, cross-border issues have affected the progress of hydropower projects such as the 6000 MW hydroelectric project which it was hoped would bring energy self-sufficiency to Ethiopia.

Christoph Frei said: 'There are enormous energy resources in sub-Saharan Africa – 30% of the world's energy commodities can be found here. But regional integration, market creation and development of long value chains will be essential to maximise their potential for the region where regional co-operation is a key factor.'

'Despite good growth signals from a number of countries in the region there is still a lack of investment. In our World Energy Council Scenarios Report, we estimate that an investment of between \$1.2 trillion and \$1.4 trillion is needed to meet the energy demands of the region by 2050.'

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Some highlights on the Sustainable Energy and Environment Protection Conference

11- 15 AUGUST 2015

Dr Amos Madhlopa, Energy Research Centre, attended the Sustainable Energy & Environmental Protection (SEEP) international conference, which took place on 11-14 August 2015 at University of the West Scotland in Scotland. The conference attracted researchers and practitioners from different parts of the world who presented papers on recent developments in this space.

Some highlights of the forum are as follows:

1. Energy planning

- At present, there is more focus on supply of/demand for electricity than heat.
- Use of electricity (high grade of energy) to provide low grade heat (such as hot water for domestic applications) was criticized as a waste of exergy.
- In many cases, efforts are made to determine the demand for electricity. However, there is limited information on the demand for heat.
- Uptake of renewable energy should be investigated with a broader view, taking into consideration the demand for both electricity and heat.
- It is necessary to plan the energy mix holistically, taking into account the demand for heat. This can assist in proper matching of energy supply and demand, and realizing an effective national energy plan.

2. Combined heat and power (CHP) generation

- Production of combined heat and electricity is cost effective.
- There is limited installed capacity of CHP plants.
- Significant attention has been given to waste-to-energy potential with limited emphasis on waste energy-to-useful energy (e.g. what potential of waste heat exists?)
- Capturing waste heat from thermal power plants is a good strategy to promote sustainability.

3. Energy storage

- Storage of heat is cheaper than that of electricity.
- Cost of electricity storage (e.g. through batteries) may become competitive, with increase in learning rate.

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Fynbos fuel properties

I am an Archaeology/Anthropology PhD student from Arizona State University working on wood selection in the Cape Floral Region throughout time. I am investigating the economics of fuel selection in hunter-gatherer societies, and connecting this with archaeological charcoal records from sites in the Cape Floral Region to better understand environmental change and impact over time.

I am looking for fuel properties of the woody fynbos species in order to build my model of fuel selection. Specifically, I am interested in caloric, ash, density, and moisture contents, and time/temperature combustion profiles. I have found this information in various publications for true wood species, but haven't found anything thus far for shrubby fynbos species.

I would be grateful for information that exists, and where I can find it if available

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Book launch: Energy Modelling and Computations in the Building Envelope

Energy Modelling and Computations in the Building Envelope by Alexander V. Dimitrov provides comprehensive coverage of this environmentally and economically important topic, from the physics of energy transfer to its numerical estimation. The book is especially useful to those looking to increase building energy efficiency, decrease the consumption of primary energy carriers, and raise the ecological sustainability of construction products.

Features

- Provides an innovative physical model of energy transformations taking place in the building envelope at the microscopic level
- Uses the physical model in the design of a generalized mathematical function for energy transfer in discrete areas of the building envelope
- Includes numerical examples of energy transfer estimation, as well as models that can form the basis of algorithms implemented in subsequent computer codes

Summary

Energy Modelling and Computations in the Building Envelope instils a deeper understanding of the energy interactions between buildings and the environment, based on the analysis of transfer processes operating in the building envelope components at the microscopic level. The author:

- Proposes a generalized physics model that describes these interactions at the microscopic level via the macroscopic characteristics of the building envelope
- Presents mathematical models that utilize classical analytical tools and can be used to perform quantitative predictions of the consequences of the energy interactions
- Reveals easy-to-apply engineering methods concerning the design and inspection of the building envelope, taking into account the effects of energy on the envelope

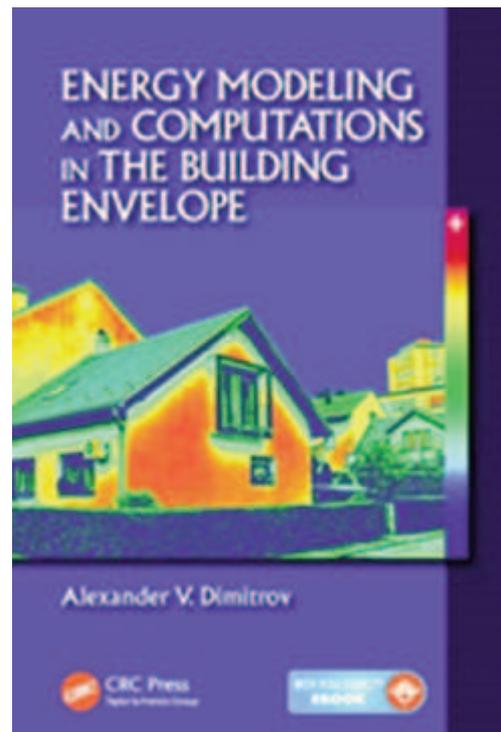
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Women in oil and gas conference

OVERVIEW

With new discoveries of oil and gas in many parts of Africa, the continent has become attractive to investors from all over the world looking to partake in the opportunities of oil and gas on the continent - In 2013 alone, six of the top ten global discoveries by size were made in Africa, from proven oil reserve totalling 130 billion barrels, Africa produced nearly nine million barrels of crude oil per day (bbl/d) in 2013. Nearly 84% of this oil production came from Nigeria, Libya, Algeria, Egypt and Angola. Africa has proven natural gas reserves of 502 trillion cubic feet (Tcf) with 90% of the continent's annual natural gas production of 6.5Tcf coming from Nigeria, Libya, Algeria and Egypt. Africa as a continent has nearly 70 years of natural gas production available given current production rates.

The challenges facing oil and gas operations in Africa continue to be diverse and numerous issues, e. g. fraud, corruption, theft, limited infrastructure, protectionist governments and lack of skilled resources among others. Regulatory uncertainty and delays in passing laws are severely inhibiting sector development in many countries around the continent. Some key players have delayed or cancelled projects until further clarity can be obtained in their respective territories as they simply cannot move forward with doubts given the long-term nature of the needed investments. Due to the number of challenges in the market, meticulous planning is vital to success on the continent.

Truly, for the oil and gas industry to make headway in Africa, the industry needs women skills to drive the processes that are challenging the industry which should be used as a backbone for the industry. The good news is that some key players in the

industry have already begun leveraging the benefits of women skills and local contents in the industry.

This exciting and challenging two-day event took place at the Amabhube-si Training Centre, Ferndale, Rand-burg, Johannesburg, for women (and supporting men) and was intended to be a forum of discussions and a net-working place for professionals, admin-istrators, bankers, policy makers and others.

ATTENDANCE

The conference was aimed at:

- Women in LNG, Upstream, Mid and Downstream sectors
- Women lawyers in oil and gas
- Women bankers in oil and gas
- Women in investment (oil and gas) houses

OBJECTIVES

- To develop trained, experienced and motivated women for vibrant growth in oil and gas
- To draw themes for investment climate in oil and gas sector and International cooperation including Joint Ventures.
- To meet challenges of energy requirements and maximise hydro-carbon resources for the energy sector
- To provide a forum for National and International experts in the oil and gas industry to exchange views and share their knowledge, expertise and experiences
- To explore areas of growth in petroleum technology exploration, refining, pipeline, transportation, petro-chemicals, natural gas, LNG, petroleum trade, legal, human resource development, marketing, research and development, information technology, safety, health and environment management in the oil and gas sector.

- relevant contemporary technologies to meet the challenges facing the oil and gas

HIGHLIGHTS

- The Women Shortage In Oil And Gas In Africa
- Where Are Banks Putting Their Money To Work?
- The Legislative Framework For Regulating Maximum Prices Of Piped-Gas
- Fraud And Corruption
- The Performance Of JVS And Investment.
- Local Content And Services
- Agenda For A Framework To Facilitate Shared And Enduring Prosperity In Africa
- Applicable Laws: The Fiscal And Legal Must Haves For Foreign loc's Doing Business In South Africa

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APO Announces the winner of the 2015 APO Energy Media Award

GHANAIAN JOURNALIST KOFI ADU DOMFEH, FIRST PLACE WINNER OF THE APO ENERGY MEDIA AWARD

Kofi Adu Domfeh from Ghana has been selected as the 1st place winner of the 2015 APO Energy Media Award. Kofi. He has also won a year's access to over 600 airport VIP lounges worldwide.

The APO Energy Media Award celebrates brilliant and inspiring stories about Energy in Africa. The subject matter may comprise a single topic or a variety of subjects, including – but not limited to – oil, gas, electricity, geothermal energy, hydropower, solar energy, wind power, nuclear, coal, biomass and more. Stories are judged on content, writing, analysis, creativity, human interest and community impact.

Kofi Adu Domfeh's report titled: 'Future Concern is No Longer about Energy Security but Climate Change' stood out for the quality of the reporting, and the depth of analysis into Ghana's efforts to diversify from fossil fuels and address climate change. Domfeh's report also gave voice to the many opinions of African experts and advocates in the energy sector.

'We warmly congratulate Kofi Adu Domfeh for winning the 2015 APO Energy Media Award. We hope that this experience at the Africa Energy Forum in Dubai would be a memorable one for him', comments Nicolas Pompigne-Mognard, APO Founder and CEO.



Kofi Adu Domfeh

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North West University hosts Solar PV introductory training

The North West University (NWU), Potchefstroom campus boasts a campus grid-tied PV solar installation system which comprises a 5 x 3kW solar PV system that feeds directly into the engineering faculty's grid. In addition, a 1 x 3kW island system is installed close to the main entrance of the faculty with the main purpose of charging three electric scooters and an electric bicycle used as transport on the campus.

SUNCybernetics presents the Introduction to Solar PV training course using a generic training module and the NWU's PV installation as the practical example to showcase the preparation, planning, project execution, installation techniques and commissioning of PV-plant installations on different roof areas.

The PV training course covers the possibilities of PV technology and using solar radiation as an energy source whilst addressing the various technical considerations like fuse choices, overvoltage and EMF-protection, monitoring, metering, the electrical circuits as well as troubleshooting PV-plants. In addition an understanding of the basic functionality of PV systems and the different types of applications and their potential is discussed.

The next training date at North West University in Potchefstroom is 19 November 2015.

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Green public relations

Green public relations is on the rise to address increased government intervention, public scrutiny and media attention regarding environmental concerns. On a global scale, industry is adopting "green" business practices, not only to reduce costs, but also in support of reputation management and brand building. A sub-field of public relations, Green PR communicates an organisation's corporate social responsibility or environmentally friendly practices to the public. The goal is to produce increased brand awareness and improve the organisation's reputation.

Green PR is also about environmental sustainability. It focuses on consumer trends towards sustainable products and services, and social responsibility. It is used to differentiate an organisation from the rest of the green market.

The term Green PR is derived from the "green movement", an ideology which seeks to minimise the effect of human activity on the environment.

Today's energy and environmental concerns are creating unlimited opportunities to solve the greatest challenge of our lifetime: preventing the effects of climate change. Many business start-ups are focused on developing clean energy technologies that help reduce the use of fossil fuels and carbon emissions and increase energy supplies and independence.

Companies around the world are embracing environmental responsibility as a core business strategy and undertaking sustainability initiatives that encourage greater stewardship of the planet.

According to Suza Adam, managing member of Johannesburg-based green PR public relations agency, Spindle Communications, "Green PR is vital to the success of any business to capitalize on current marketing trends. If your company does not currently have an environmental or Green PR strategy you could be losing customers."

It has tremendous value for companies engaged in green technologies such as green software that monitor or reduce energy usage and promote conservation; alternative energy (solar, wind, hydro), green consumer products and services; ecotourism, companies that are manufacturing using green processes, companies that manufacture green products, developers of green buildings, research and development outfits, educational programs and outreach, and green entrepreneurs.

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Energy events 2015–16

NOVEMBER 2015

16 - 20

ENERGY MANAGEMENT FOR A SUSTAINABLE SOUTH AFRICA
Pretoria, South Africa
Website: www.tut.ac.za

JANUARY 2016

20 – 21

LIGNOFUELS 2016
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MARCH 2016

15 – 16

POWER & ELECTRICITY WORLD AFRICA 2016
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Energy Management News

The newsletter is published quarterly by the Energy Research Centre (ERC) of the University of Cape Town.

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Enquiries, comments, articles, and information on energy events are welcome, and should be sent to:

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JOURNAL OF ENERGY IN SOUTHERN AFRICA

The *Journal of Energy in Southern Africa (JESA)* has been running for 22 years, and has proved to be of a consistently high standard and to have a widening subscription base. The key receivers of this quarterly journal are researchers, consulting engineers, energy producers, energy consumers and decision makers.

The publication is balanced, representative, up to date and authoritative. It is becoming increasingly known in other countries especially in Africa.

The JESA is a successful vehicle for the dissemination of information on the latest results and activities in the Southern African energy field, publicising results achieved and stimulating future activities. The potential impact in terms of distribution is the whole of sub-Saharan Africa. It covers matters of local and regional interest as opposed to the internationally high technology content of other journals serving energy interests.

The JESA is now an online publication only, and available freely on the website of the Energy Research Centre, University of Cape Town: www.erc.uct.ac.za