UNITY IN VARIETY
BUILDING THE NEW TRACTEBEL
CONTENTS

UNITY IN VARIETY
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EDITO ➔ 3

UNITY IN VARIETY
BUILDING THE NEW TRACTEBEL ➔ 4

ZOOM
POSITIVELY PREPARING FOR FLOODS ➔ 7
AUSSIG POLDER - GERMANY

CUTTING EDGE
A TALL ORDER IN ENERGY EFFICIENCY ➔ 9
CASABLANCA TOWER MOROCCO

CORE
HYDRO-POWER TO THE PEOPLE ➔ 11
HPP KALETA - GUINEA

CUTTING EDGE
A HOTLY CONTESTED ➔ 14
& SHARED 100 MW CSP WIN!

OUR WAY
SHOOTING AROUND INDIA ➔ 16
FOR PERFECT POWER PICS

ZOOM
WIND WORKS WORLDWIDE! ➔ 19

BRIEFLY
HYDRO BORDEAUX ➔ 21

WATER SECURITY FOR SRI LANKA ➔ 22
AND A HUGE NEW CONTRACT FOR LAHMEYER

A HIGH-POWER VISIT ➔ 23
NOUAKCHOTT WIND FARM

ICI PARIS ➔ 24

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CROSSWAYS IS THE INTERNAL MAGAZINE OF TRACTEBEL ENGINEERING AND ITS REGIONAL COMPANIES. IT IS PUBLISHED 3 TIMES A YEAR.
Dear reader,
Dear colleagues,

The busy year of 2015 is drawing to a close – with activity and events in full flow right to the end.

As I write this, the potentially ground-changing event of COP21 in Paris is just beginning. Two weeks of UN negotiations, debate and, hopefully, agreement on a binding, global commitment to mitigate climate change. For the planet’s sake I hope it happens. It has big implications for the Group and the pace of change in our own business too. The pace, but not the direction...

ENGIE has made it clear that it is committed to supporting more sustainable energy and are relying on us, as its engineers, to follow suit.

We’ve been working to create a better and more sustainable world for some time already. Through projects developing renewable energies; leveraging energy efficiency in industry, power plants, buildings and mobility; providing water management solutions in many forms; to R&D and the development of Smart Grid tools; to the many other projects we manage integrating technical expertise with care for environmental and social impacts. All of these activities, including nuclear, lead directly, sometimes indirectly, to lower CO₂ emissions and contribute to Shaping our World for tomorrow.

Some of these missions are highlighted in this Crossways edition and in the Crossover we’ve just sent to our clients. I encourage you to take a look at the four short films we produced for the COP21 gathering, available on YouTube and My Portal.

I am certain that seeing just some of the ways we are playing a part in global climate change mitigation will leave you feeling as proud as I am of our company. I applaud you all for your commitment, conviction and efforts and look forward to 2016 when there’ll be more to come - as we focus on growing even more efficient in driving positive change.

Until then, I wish you and your loved ones a peaceful and happy Christmas - and a well-deserved break ahead of an excellent and successful new year!

Daniel Develay
Chief Executive Officer
Would this organisational change have happened if GDF SUEZ hadn’t changed?

Daniel Develay: Yes. We started thinking about the energy transition two years ago and at COMEX level, by January 2015, were already considering necessary organisational change. It coincided with GDF SUEZ change to ENGIE and the Group reorganisation but this was not our driver - although, that the Group has also re-organised does indicate that major change in the energy world is not a figment of our imagination; it is very real, fast and wide-reaching. So, we needed to adapt in our own right – for several reasons.

1. CLIENT NEEDS: this means listening carefully and engaging in a dialogue with our customers. We want to become inspired by their questions and dreams, as well as inspire them to make them come true. Early 2015, we held interviews with 60 of our main clients and asked them to list their challenges in coming years – and to describe how we could help them to be successful in their business. Some important messages came up.

   • Their future business contexts also hold a high degree of uncertainty and they are looking for global partners with both the technical and non-technical expertise as well as the business intelligence to guide them. Partners who are closer, mobile, reactive and flexible.

   • They have serious financial pressures and need partners who can be more locally efficient in cost and realizing their projects; providing maximum added value through the whole value chain, multidisciplinary expertise and the same high-level standard of expertise everywhere in the world. Some specific markets are even asking us to streamline their project organisation by going back to acting as EPC on “smaller” projects like off-shore substations, small scale LNG, decentralised projects etc.

   • Their future business contexts also hold a high degree of uncertainty and they are looking for global partners with both the technical and non-technical expertise as well as the business intelligence to guide them. Partners who are closer, mobile, reactive and flexible.

2. KNOWLEDGE: One of those customers is ENGIE. Isabelle Kocher is clear that she sees us as the “glue” for the Group development. To be the glue means being on top of and making best use of all knowledge – the collection, sharing, distribution of market intelligence and expertise within and across our business and the Group – and that calls for better collaboration.

3. INTEGRATION: We welcomed Lahmeyer into the Group – the acquisition bringing us a higher ranking on the global market and a huge amount of additional resources, quality competences and business contacts; many crossing with our own. We wanted to facilitate the joining of forces and give a role to our Lahmeyer colleagues to use their talents, capacity and capability to the fullest advantage.

4. ENERGY TRANSITION: There will still be leads for big power plants in our business for some time - but the evolution towards more decentralisation and de-carbonisation has begun and we need more rational business development and to spread relevant competences e.g. renewables and infrastructure, and make place for innovation, new products and new types of business...

5. GROWTH will be the final result as we are doing all of this to be more efficient, to get more diversified business growth across all regions. It requires more efficient deployment of our resources to better serve more clients, make better proposals in line with all markets and manage contracts as well as customers demand.
How does the new organisational structure help to boost business?

The new structure will bring us closer to one another as it demands entity interaction and collaboration to work. It makes sense if you picture the structure like the weave of a fabric:

- Running vertically we have our four Geographical Entities organised and run from our current main offices in Belgium, Brazil, France and Germany. Each entity is responsible for developing a territory: branch offices; new business; the local competences needed, as well as closer customer relationships in that territory.
- Running horizontally we have five transversal Business Lines: Power & Gas, Hydro, Infrastructure & Environment, Energy Transition Consulting & Innovation and Nuclear which may be based in certain territories but interweave across all the territories; contributing to business development; providing the technical expertise and project management on projects; and helping to develop locally based Business Line competences as needed. Two Business Lines, Nuclear and Energy Transition, have a P&L, as do the Geographical Entities.

The Business Lines and Geographical Entities therefore all need to work together and share knowledge to identify and develop project opportunities in a territory, respond to tenders and ensure the best possible teams to efficiently realise the projects. It requires sharing market intelligence, business introductions, technical knowledge, resources and finally team spirit to achieve this to everyone’s benefit.

Don’t the territories just create new divisive borders in the company?

The Geographical Entities don’t “own” a territory; they “take care” of a territory. It means they hold and build for the company, a complete understanding and knowledge of the territory; of the market, the culture, the key clients, the opportunities, the energy, infrastructure and water needs, competition, market benchmarks, the status of all projects in the region…

Nevertheless, none of our entities have all the competences to carry out all activities in their region. Take Belgium; it has no competence centre for dams and hydropower but is responsible for South East Asia where there is a lot of hydro business. Belgium therefore has to invite colleagues with the best competences to respond to any Hydro contract opportunities in the region. In the same way, France doesn’t have all the P&G competences needed to deal with all of Africa’s needs, so it will call on Belgium or Germany to manage some of those projects. There will still be a broad spread of international activity for most entities.

In addition, where clients or a market have a strong relationship with an entity, outside of its nominated territory, for example Lahmeyer in Angola and Sudan – or SSI on the Panama Locks, we won’t change what is working. Relationships will continue under the original entity, with the understanding that all collaborators involved in that territory are kept well informed of project and market activities – until such time, short or long term, or if ever, it feels right to transfer the business.

Is the new P&L (Profit & Loss) system and objective setting going to be as flexible?

Across the company, one global objective is set in stone – to grow our business efficiently and universally.
What is different in the new structure is that the entity that executes a contract, takes the P&L for that contract no matter which territory it is in. Balancing this out, the Geographical Entity’s performance will be measured against two objectives: growth in turnover on their business wherever they carry it out; and growth of global business, measured by all contracts won in their territory no matter which entity carries them out – making it interesting for everyone to find and develop business for other entities in their territory as well as their own.

Is this what was discussed in the management seminar in November?
The seminar involved 40 company managers who, having had time to think about the new organisation and its implications, came together to discuss how it will practically work. Part of this was defining our “Constitution”, the operational rules between the various entities outlining how entities will interact under different business situations. The constitution, important to establishing a culture of trust, sharing and transparency across the company, belongs to everyone and will be published on My Portal for everyone to see and follow.

Being closer to clients, more mobile, reactive and flexible – will people travel more or relocate?
Being closer doesn’t mean physically placing a few people close to a client’s building (although some major clients do demand that). We can’t afford to run small permanent offices everywhere – the size of a market and long-term opportunities determines when it is feasible to invest in a new office and develop local competences. Most expertise will still be fed to projects from existing centres. To be more mobile, reactive and flexible is simply to be more efficient in our activities – whether carrying out studies from an office or mobilising the right people at the right time to manage a client’s needs and project.

So what exactly do we mean by closer?
Being closer is about consistently demonstrating a good understanding of the client, to actively listen to their challenges, needs and ambitions. It’s why we want an organisation with dedicated Geographical Entities who will concentrate on gaining that full knowledge – so we can better earn our clients’ trust, better guide them and proactively adapt our services as needed.

What can people expect when they return to work in January?
A new year with challenging and, as always, gripping projects we will achieve together. There will be no overnight rupture or drastic change. Current projects will continue as normal. Transition to the new organisation will be gradual over the first part of 2016, so everyone has time to get used to new reporting structures or tasks applicable. We have to remember that our reorganisation is an internal event – it should not negatively impact our clients in any way, on the contrary, it should only result in positive benefits for them.

Will re-branding be a big part of the change?
The new name stems from the Group re-branding and reorganisation. Ultimately, there’s no question that in the long run it will fit well with our goal to step by step build a unified, aligned, single and unique worldwide company to which we all belong and contribute. But as I have communicated, this too will be a gradual process as we consider all the practical, commercial and even legal implications involved.

If you could summarise in 3 words what the new organisation represents; what would they be?
Knowledge-sharing; Cohesion; and Excellence.

Thank you Daniel Develay – we look forward to 2016 and all the positives the New Year will bring!

“Across the company, one global objective is set in stone - to grow our business efficiently and universally.”

Daniel Develay

“The essence of the beautiful is unity in variety”

Felix Mendelssohn
FUTURE FLOOD PROTECTION STARTS HERE

Anke Ezzeddine: Flood events have increased in intensity in Europe in recent years. Following severe flooding in 2002 in central Germany, major work was done to improve the flood protection along the Elbe River. As a result the Elbe lost up to 90% of its natural inundation areas due to the placement of dikes along its river banks to protect property and agricultural land. The dikes worked - but too well!

In the following floods of 2013, a consequence was the problem was transferred; either by water backing up and flooding Elbe tributaries or sent downstream to other unprotected areas. In the aftermath of the floods, affecting 8 German States, a new national flood protection programme was initiated focussed on restoring natural inundation areas along main waterways to provide controlled flood retention. Aussig Polder is one of these sites.

AN EARLY START

Lahmeyer Hydroprojekt was ahead of the rest on this; already contracted in July 2010 by the Dam Commission of the State of Saxony to design, next to the town of Aussig, a technical solution for flood retention making use of the existing dikes in place. A significant aspect of the mission was also to consider flood protection for other local areas that are equally threatened when the flooding Elbe backs water up into its tributary - the river Dahle. Within the project scope, comprehensive preliminary design work was done based on predicted return-of-flood periods between 10 and 100 years, using 2-D modelling and data from several studies. Studies included; implementation of a groundwater monitoring network, supplementary topographic surveying, soil investigations and research of land titles for ownership and rent, as well as wide-ranging scoping of environmental impacts. Comparison of alternative solutions, taking into consideration local environmental protection issues and significant structures in the area was then carried out. The preferred solution - Aussig Polder - was presented to local stakeholders in public meetings before the detailed design of the mass scheme commenced.

AUSSIG POLDER - THE DEFINED SOLUTION

The Aussig Polder will be constructed on the left bank of the Elbe in the space between the river and the town of Aussig, bordered on the other side by the river Dahle. It will open up a flood plain area of 360 ha of agricultural land - which can still be farmed in the years between floods. The concept involves installing intake and outlet gates in the dike wall between the Elbe River and the polder allowing the flood plain to be filled during a flood and emptied afterwards. A retention volume of some 11 million m³ should provide containment of a 100-year return period flood on the Elbe.

A reality of climate change is the need to prepare for flooding. But, ironically, the worst, recent floods in Germany were displaced floods made worse by flood protection structures. This challenged Lahmeyer Hydroprojekt to re-look at how inevitable future floods on the Elbe River can be better contained using polders and other structures.

What is a polder?

A polder is an area of land protected from a nearby body of water by embankments known as dikes; either as reclaimed land or as a prepared flood plain or basin; the latter being an area that can be flooded during a flood event to lower the river flood wave that would otherwise pass on downstream. This is particularly effective flood retention solution when multiple polders function as a system along a river.
Partially filling in the replaced current reach of river, but leaving a depression that can be filled as an additional water retaining pool when needed during floods.

EVERY LAST DETAIL CONSIDERED
Finishing touches to the scheme required additional functional works as well as obligatory local ecological measures:

- Raising 300 m of the provincial road by 1 m to avoid frequent flooding.
- Construction of a dedicated transformer station and a permanent subsidiary grid, including distribution, to ensure the supply of electric power to the structures during floods.
- Monitoring and automatic and manual control facilities for all systems and transmission.
- Development of several protection and defence measures such as dike relocation in the vicinity of valuable tree groves and beaver habitats.
- Plans for replacement measures such as reforestation where needed.

CURRENT STATUS
After four years work, the design was submitted in August 2014 for approval; anticipated by the end of this year. On approval, Lahmeyer Hydroprojekt will continue with the engineering as required prior to construction supervision of the scheme.

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Proof that energy efficiency is an increasing global concern, a future iconic building of a new financial city district - the Casablanca Finance City Tower is set to make a real statement in the semi-desert Moroccan city; both for its daring and complex structure and its high levels of energy efficiency.

The tower will feature a large volume, transparent ground floor, a mezzanine level, 25 upper floors and six underground parking levels. It will have a total surface area of approximately 33,000 m² and will be 100 m high. The facade has a three-dimensional facade with intricate external latticework and sun screening providing aesthetic and practical shading. Designed by Morphosis Architect - Tom Mayne, the ground floor and top of the tower are shaped like an intricate crystal prism, echoed in the main tower structure; creating a striking landmark.

A GEM OF A PROJECT

Gautier Baudru: On this project SSI is collabo-rating with Tractebel Engineering France (see insert) who, with VS-A Group - known French facade specialists and OIM (Oger International Maroc) local civil engineering partners, won the contract for the studies for the civil engineering and technical equipment in a tender issued by MF BOARD in the summer of 2014. The USA ar-chitect office Morphosis and the “crystal-like” prism design had already been selected, and both the architect and developer were looking for partners with highly rated experience and engineering expertise to help deliver what is, structurally, a very challenging building – they found this in the Tractebel Engineering France, SSI/VS-A/OIM consortium.

Within the scope, SSI’s mission focusses on the technical equipment; ranging from plumbing, to lifts, surveillance and communication systems to ventilation and fire control... But because the client also wants the building to set a high benchmark in energy efficiency in line with modern urban building and attain at least “Silver” LEED-certification, our energy efficiency expertise and Passive House building standards experience was also called for.
APPLYING PASSIVE PRINCIPLES

Passive building is a European standard primarily based on the need to achieve energy efficient thermal comfort in a building. In Casablanca, the thermal assumptions are quite different as the typically sunny winter temperature is usually at least 4°C with summer highs rarely going into the 30° thanks to the cooling Canary current off the Atlantic coast. So technically, we can’t label this a passive building, but many of the principles have been applied in our studies. The most important thing in achieving a low energy building being to consider how all elements; the structure, facade and technical equipment will work together, modelling and simulating the thermal behaviour and more at an early design stage to find the best solutions between all the possibilities.

SIMPLE, BUT DAZZLING SOLUTIONS

Working closely, with good interactions with the architects, our colleagues in France, VS-A on the facade elements, our structural expert colleagues in France, the construction engineers OIM and Moroccan Authorities, has been key to defining the energy design. For example; determining the optimum orientation of the building facades in terms of sunlight, the type of glass to be used and persuading the architect to adapt the joints of the 3 types of facades to assist the thermal and ventilation functions.

It’s always a matter of finding a balance. In engineering terms the ideal building controlling energy consumption has a closed wall facade, with just enough windows to provide natural light to reduce artificial lighting needs. The architect’s transparent “crystal” vision for the Casablanca Tower is not exactly ideal for this, but we can still work with it to achieve a good, high level of efficiency in other ways. Driven by the goal to reduce overall energy needs and reduce construction and technical installation costs our team has defined several solutions that together will help achieve the goal:

• Keeping “active” heating to a minimum: two highly efficient heat pumps are used to advantage because the conditions of performance is high.
• Harnessing the floors’ thermal mass inertia, heat and cold can be collected and redistributed.
• Wrapping the building in solar shading to protect it against the desert sun while maintaining city-views.
• Careful selection of office positioning to make best use of natural light and reduce artificial lighting (LED).
• Motion & twilight detectors as well as dimmers to further reduce loads.
• Concentrating all air handling units in a central location to reduce air duct length.
• Installation of two electrical production centres (one in the basement to feed the lower part of the tower and to manage the air-handling-units; one at the top to feed the upper part of the tower and to manage the PV Solar energy production) - the proximity to the technical equipment reducing material needs and cutting energy losses.
• Feeding ventilation exhaust air through a high efficiency rotary (heat) exchanger able to recover more than 85% of the total energy and latent energy (humidity) of “used” air.
• Cooling provided by three water chillers connected to cooling towers.
• Installing transparent solar panels directly on the glazed façade are an innovation being considered.

ON TO REALISATION...

All in all, the preparatory studies took one year. The construction, aiming to complete early 2018 will be underway by the end of this year, breaking ground on a ground-breaking project that we are happy to add to our list of references in energy efficiency – and the growing list of avant-garde “towering” projects collaborated on with our structural expert colleagues in France.

More info:
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THE NEED TO BUILD STRUCTURALLY SOUND PARTNERSHIPS

Following the design phase, the next and main challenge for the Casablanca Tower is the construction due to the structure shape and deep excavations needed to develop the foundation and underground floors - which is essentially why Tractebel Engineering France, as the lead civil and structural engineering experts, are responsible for heading the consortium.

While the structure of a building in terms of its tendency to live up to its supporting “skeleton” is not directly related to its ability to be more, or less, energy efficient, such projects often go hand in hand at the request of the client at tender phase. When they decide they want to keep all engineering elements under one contract, as in this case, it makes good business sense for us to collaborate with SSI, as our French infrastructure division doesn’t have the same level of technical equipment and energy efficiency competences that they do.

It’s not the first, or last time we share projects - another major joint project on our books is the maritime urban development of Anse Du Portier in Monaco - and I am sure our collaboration will be just as successful.

Further increasing opportunities, a goal facilitated by the new organisation could be to transfer more of SSI’s competences to our local offices, or develop them so that we can work even more efficiently together in infrastructure; in closer proximity to our clients and the large projects developing in this sector.

Sohrab Baghery - Executive Vice President - Major Projects - Tractebel Engineering France
One goal of the energy transition is to provide access to sustainable energy for all. 60 years after it was designed, the completion of Kaléta 240 MW Hydro Power Plant in Guinea helps do this - doubling the country’s energy capacity and improving connecting infrastructure. It is a project that has changed the lives of many Guineans - and one that is a special story for Tractebel Engineering France for many reasons…

TAKE A COUNTRY WITH GREAT POTENTIAL…
Jean-Louis Cervetti: The story of Guinea is interesting. Nicknamed the Water Tower of West Africa it has unusually large water resources: the Niger, Senegal, Gambia and Konkouré Rivers all start in Guinea; and average rainfall at the Kaléta site is about 4m/annum. So it’s ironic that it’s taken so long for the country to benefit from this. The country is also rich in minerals; the world’s largest Bauxite deposit, iron, gold, diamonds and uranium, but it hasn’t had the power capacity to develop ports, major roads, railways, mines and major industry. So economic growth has been minimal… Until Kaléta HPP was completed, only 5% of around 12 million inhabitants had intermittent electricity connection!

...AND GIVE IT POWER!
Kaléta dam, envisaged as part of a cascade of 4 dams on the Konkouré River, was designed by A. Coyne (as in Coyne et Bellier) around 1952. But with Guinea’s independence in 1958, all works were stopped due to force majeure. Years later, we went back to build the first of the cascade dams, Garafiri Hydro Power Plant 75 MW, commissioned in 2000, which, at the time, also more than doubled Guinea’s total electricity capacity of just 50 MW. From Garafiri it was planned to go straight on to Kaléta project. But, again due to politics, Guinea waited 12 years until the current President Alpha Condé gave the go ahead in 2011.

240 MW KALETÁ HPP - REALISED
Benoît Jacquemart: Kaléta dam is 150 km north east from Conakry. It is a concrete run-of-river dam built at an exceptional site where the Konkoué River splits into different branches with a waterfall of about 30 m high and an average discharge of 346 m³/s. Using the natural morphology to advantage, the dam has a low “snaking” structure as it follows the optimum river crossing points. Its height is only 25 m as the natural drop of the waterfall contributes to the total head to 45 - 50 m, depending on seasonal hydro-conditions. It has one central powerhouse with 3 turbine units of 80 MW. The main river branch and waterfall provide a 300 m wide spillway. Altogether it’s a simple but effective design. Construction by CWE began in 2012 and progressed steadily until, in May, July and August 2015, the 3 units were systematically put into operation - 8 months ahead of schedule. On September 28, the dam was inaugurated by President Alpha Condé in a festive ceremony and a typical rainstorm.

DIFFERENT PARTIES - ONE GOAL
This is not the first time we have worked with China Water & Electricity Company as EPC - we’ve had projects in Nigeria,
Central Africa and Cameroon… Like most Chinese EPC they have their own ways of doing things, but work hard and make good progress which was important to our client. Our own contract was with the Administration et Contrôle des Grands Projets et Marchés Publics (ACGPMP) for owners Ministère de l’Énergie et de l’Hydraulique represented by Projet d’Aménagement Hydroélectrique de Kaléta Souapiti (PAHKS). But Government as a whole was interested in the project progress and a fast delivery. As did CWE, our site team of 10-15 international engineers and about 40 Guineans worked hard to deliver this; on site and from a local office in Conakry. Altogether, about 100 employees from Tractebel Engineering France’s head office have participated in the project since 2011.

**THE EBOLA THREAT!**

Living on site in camp is not easy at the best of times; but the outbreak of Ebola haemorrhagic fever in 2014 in the region was a challenge nobody expected. Countries worst hit were Liberia and Sierra Leone to the South of Guinea, but by March 2014, the virus had reached Conakry. “The panic in the world media made the situation seem worse than it was - it was bad but the virus is not airborne and only direct contact with an infected person puts you in danger. Everyone on the project was educated on preventative measures and in our “isolated” Kaléta site there were no threatening cases. In March, we did postpone a meeting while management consulted with International SOS before making the informed decision that the mission could continue with ongoing monitoring of the situation. Travelling became complicated; but was managed. It is Group policy that no one is forced to go or stay on a mission if they feel they are in danger. That our team chose to continue says a lot for the dedication of our engineers in meeting their commitments.”

Jean-Louis Cervetti.

**BRINGING A CLEAR PERSPECTIVE**

Amid the general excitement about the new power on its way, our challenge in reviewing designs, questioning stability, computations, electricity calculations… was to be the practical and far-seeing eyes of the client in terms of understanding the thinking behind the EPC designs, finding the balance between Chinese and International standards and ensuring that everything complied with the contract. It was an interesting challenge to manage the different views of everyone involved. For CWE whose reference of a major dam is Three Gorges in China, this is a small dam and reservoir. In their assessment of flood potential, or the danger of a dam break, for example, the risk was equally small. We had to be clear that for Guinea, Kaléta is the equivalent to the Three Gorges Dam. While any compromise might not put people...
directly at risk - a malfunction would lose half the country’s electricity supply. Having our colleague Peng Zhou (see insert) on hand and often on site was a major added value in many discussions.

CONNECTING ASSIGNMENTS
Outside of much earlier environmental assessments, the design and construction supervision of Kaléta and a short technical training programme for the Government’s project team, an additional part of the mission scope was managing the realisation of associated infrastructure. Compared to a few years ago, these projects have provided locals with access to markets and necessities from which they were previously cut off.

Projects included:
- 75 km of wide gravel road extending the route from Conakry to Kaléta - reducing travel time from 4 to 5 hrs on the previous small track to an easy 1.5 hrs by car.
- 3 bridges - one of 100 m crossing of the Badi River replacing a rickety pontoon ferry system.
- 8 substations and powerlines:
  - An OHL transmission line 220kV/140km from Kaléta - Conakry
  - A 30 kV local electrification of hillside villages near to Kaléta - an important compensation for people displaced by the small dam reservoir and works.
  - 225 kV Interregional connections

J-LC: 75 km of road and a new bridge or two might not seem much to most of us, but as the team that has spent time “camping” in the country and taking part in the achievement knows, these projects, along with the new power delivered by Kaléta, will go a long way to decrease the poverty in that region.

INTERCULTURAL MANAGEMENT
Peng Zhou:
In hydropower sector, markets in Africa evolve quickly in terms of techniques, contracts and geopolitical contexts. Besides a historical European presence, more and more Chinese actors appear in the markets providing complete service packages, from financing, design to construction. For Kaléta project, an effective collaboration between French experts, Guinean client and Chinese contractor has been the key to the success of the project. On top of my role as an engineer, I was able to contribute to the technical and cultural interface management to help the project run more smoothly.

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- Peng Zhou - Civil Engineer Hydropower Tractebel Engineering France - peng.zhou@gdfsuez.com
Keeping it all in the family, Tractebel Engineering not only helped ENGIE and partners win the concession for 100 MW Kathu Concentrated Solar Power in South Africa, but is going on to see the project through with Lahmeyer leading the Owner’s Engineer mission - our first large Renewable Energy project won as a global team!

A HOTLY CONTESTED & SHARED 100 MW CSP WIN!

A SIZZLING & SIZABLE PROJECT

Kathu Concentrated Solar Power (CSP) project in South Africa is a build, own and operate project owned by ENGIE and consortium partners; Anglo American Trust, Investec, Lareko-Métier and PIC. The design concept is based on Parabolic Trough Technology (rows of curved mirrors with thermal oil as the heat transfer fluid), driving a power plant with a 100MW capacity. The plant also incorporates molten salt thermal storage tanks allowing power generation for an additional 4.5 hours after sunset. The Owner’s Engineer mission is being led by Project Manager - Javier Herrera from Lahmeyer, supported by a mixed Lahmeyer/Tractebel Engineering project team and local partners Thabo Consulting. The EPC/technology providers are Spanish - Sener/Acciona. Realisation is expected to take 28 months, with an extended guarantee period as needed to fully test the plant against DNI variables and conditions over time.

IN IT TO WIN IT

Emmanuel Van Vyve: Our involvement on Kathu began end 2013 when we - P&G Renewable Energy won the contract to support ENGIE as advisors on the preparation of their bid entry for South Africa’s Renewable Energy auction in March 2014. These Independent Power Producer Renewable auctions are held regularly to help stimulate and achieve South Africa’s desired renewable energy growth - but also to help meet the country’s urgent power needs. All electricity produced by the IPP projects therefore has to be sold to the national utility Eskom - making the generated electricity cost, or tariff, a key decider in the auctions. It’s very competitive.

1. Pre-bid submission - our first task was therefore to help ENGIE reach the most competitive bid. After a rapid site visit just days after winning the contract, we looked at everything that could be optimised to achieve a competitive, yet profitable electricity price; EPC design, time schedules, plant configuration… An important part being the molten salt storage component as a special tariff was offered for evening peak hours just after dark. We had to find the optimum balance between the oversizing of Concentrated Solar Power production to have excess energy to heat the molten salt, the size and cost of the storage and the revenue that could be obtained over those additional hours of production.

It worked. Notice came through in December 2014 that, with the Kathu bid, ENGIE and its partners had won one of the 20 year Public Private Partnership concessions on offer. This activated phase 2 of our initial contract and it was back to work.

2. Post-bid - starting in January 2015, post-bid activities mainly focused on achieving financial close of the project, finalisation of EPC contracts and follow-up of early site activities, including an extensive geotechnical survey overseen with the help of SSI to guarantee reliable results. In June, in preparation for the construction phase, ENGIE launched a request for proposal for the Owner’s Engineer contract. Having knowledge of the project, the site, planning etc. we were in a good position to show interest and make a good case for our participation.

WHEN TWO IS STRONGER THAN ONE

Robert Berdal: By then, Lahmeyer had joined the company and we were already sharing competences - integrating Alexander Stryk (see pg. 11 Crossways 28) from Lahmeyer in the post-bid team over the summer. Bringing significant expertise, particularly in discussions from Lahmeyer in the post-bid team over the summer. That says it all!

Robert Berdal: By then, Lahmeyer had joined the company and we were already sharing competences - integrating Alexander Stryk from Lahmeyer in the post-bid team over the summer. Bringing significant expertise, particularly in discussions from Lahmeyer in the post-bid team over the summer. That says it all!
Where most projects are a win-win, this is a win-win-win! For ENGIE, as we supported them in winning the concession and for us Tractebel Engineering Belgium and Lahmeyer, as thanks to our collaboration we won the Owner's Engineer project in a very competitive environment. Now we really have an opportunity to work together on the field. Since our collaboration started we've effectively doubled our capacity in Renewable Energy, allying our competences and references, which is interesting for the new Tractebel organisation and will generate new joint projects.

Robert Berdal - Product Director Renewable Energy, P&G, Tractebel Engineering

OVER TO LAHMeyer

Thomas Klinge: Certainly our joint knowledge of several Concentrated Solar Power projects gave us good insights when putting together our offer. On top of that Lahmeyer has quite a number of dedicated CSP specialists in our division, bringing experience and references in a number of different types of solar missions including 3 CSP projects in South Africa as independent engineer. This is useful, alongside the Upington contract*, as we also have a base office in Johannesburg and some knowledge of the market and have a good contact with a local, level 1 BEE (black empowerment employee) engineering company Thabo - a requirement of South African law and requested by ENGIE.

TWO CRITICAL PHASES

As a typical Owner's Engineer mission, our services cover two main phases: the design review services which are already underway from our various offices involving up to 14 people; and the construction and commissioning which will implicate a core team of up to 18 people. This phase may also include supervision of transmission infrastructure and line connections to the grid.

CHALLENGES AHEAD - BUT THE SUN SHINES ON...

Between our teams we are technically-speaking more than on top of things, but that's not to say there won't be challenges. The schedule is neat and our performance will be highly scrutinised. As a first job for Lahmeyer in renewables for ENGIE we don't want to disappoint. Mobilising to a remote location, where local signs warn you to “Beware of the Snakes” and a neighbouring town is called “Hotazel” (Hot as Hell) tells you setting up will be testing. As will be managing a full on site peak workforce of around 1000 local people. But it's a project welcomed for its employment opportunities during construction and later in operation so it has local support. At the end of the day, coming from Belgium, Germany, South Africa, with an EPC from Spain, this is going to be quite the multi-cultural team - the first of many in all of our futures we hope - and so we want it to succeed on every level.

Robert Berdal - Product Director Renewable Energy, P&G, Tractebel Engineering

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IT ALL COMES OUT IN THE WASH

In case you’ve ever wondered, the solar mirrors need to be washed frequently to maintain their efficiency in reflecting the heat of the sun onto the central heat transfer fluid tube. Cleaning is achieved by special trucks (like road sweepers) that pass down the rows at night when the mirrors are not in use. Part of operational optimisation concerns finding the balance between how often cleaning is necessary vs the use of water in an arid region.

THE BIG PICTURE

KATHU CSP

- Direct Normal Irradiation = 2,715 kWh/m²/year
- Solar field area = 3.51 km²
- 1000 parabolic trough elements
- 160 km of piping (oil) under concentrated solar mirrors
- 384,000 mirrors
- Molten salt thermal storage tanks 1,300 MWhth (45,000 t of molten salt)
- 8 km of new transmission line to existing 132 kV grid line

HOTAZEL - SOUTH AFRICA

“Where most projects are a win-win, this is a win-win-win! For ENGIE, as we supported them in winning the concession and for us Tractebel Engineering Belgium and Lahmeyer, as thanks to our collaboration we won the Owner’s Engineer project in a very competitive environment. Now we really have an opportunity to work together on the field. Since our collaboration started we’ve effectively doubled our capacity in Renewable Energy, allying our competences and references, which is interesting for the new Tractebel organisation and will generate new joint projects.”

Robert Berdal - Product Director Renewable Energy, P&G, Tractebel Engineering
SNAP TO IT!
Vertika Saxena: The assignment was to photograph power projects in India in order to build our photo library with quality, client approved photos with copyright. It all sounded simple enough: select key projects, get a professional photographer to shoot them and voila! In reality it took 8 months to decide projects, including some from Lahmeyer India, get approvals, contract the right photographer, manage budgets and travel etc. But in the end we had 5 different projects covering our main power activities in India: 2 x Renewable Energy, 2 x Thermal PP and 1 x T&D.

MOBILISING THE TEAM
We were a team of three: Mr. Parav Sahni the photographer; I was there to lead the tour and guide the creative in line with brand guidelines; and I’d asked for an engineer to advise us on the technical relevance of the plant views we were shooting. Mohd Arif is a mechanical lead engineer and already knew some of the projects, so he was a great help. As it turned out, he was also very talented at suggesting creative shots, carrying camera equipment and as a model!

Thousands of kilometres, snakes, gale-force winds, torrential rains... what would you go through to get the perfect power engineering photos? Vertika Saxena, Communications Officer and Mohd Arif, Mechanical Engineer speak from experience...

HITTING THE LONG & WINDING ROAD
Mohd Arif: India is huge and we had a lot of ground to cover between sites. As engineers will know, many sites we work on are in remote places and these were no different. We had 10 days; allowing one day’s shooting for each of the 5 projects and travel days in between. Every day, starting early in the morning and wrapping up late at night after planning the next day, brought something different in terms of project, location, weather, challenges and new cultural experiences...

"This assignment taught me so much, both from the project coordination and management point of view but I also have a whole new appreciation of what our company achieves and the amount of time, effort and energy our engineers put into building an efficient plant or installation - as well as the conditions they face on site."

Vertika Saxena - Communications Officer, Tractebel Engineering India

SHOOTING AROUND INDIA FOR PERFECT POWER PICS

SHOOT 1
A SUNNY START

9 MW Solar PV Power Plant - CESC Ltd.

VS: The first site was a promising start as the day was sunny and we were welcomed by the client who even offered some of the plant staff as models. The photography was trickier. A solar PV plant is essentially rows and rows of panels, so it was hard to find interesting angles and we trekked all around the site to find them. That’s when we heard about the snakes! Indian Hindus worship many things and within this solar site, there’s a temple dedicated to and home to a whole colony of snakes that live under the structure. While the photographer focussed on the panels reflecting the blue sky and white clouds, I focussed on looking for snakes so he didn’t get bitten.
SHOOT 3
HIGH TIDE WARNING & LADDERS

66 kV T&D Switchyard - Hazira LNG Pvt Ltd

VS: Hazira LNG plant was a long day’s drive away. On the way, the client called to say the coast guard had issued a high tide warning which was a safety concern. We checked with Brussels as to protocol and were told as long as we weren’t putting ourselves at unnecessary risk, we could wait and see. Praying for good weather worked - when we got to the site it was sunny. But safety was still the order of the day as Health & Safety around LNG is very strict. Fortunately, the switchyard was just bordering the LNG site, so our “camera clicking” wasn’t a danger in terms of potentially igniting the gas works. Even so, we received a full safety induction and Personal Protective Equipment to put on. Wearing an added 15kg of gear, boots etc. all day was a challenge! A bigger issue was, due to earlier rain, the floor of the open-air switchyard was wet, which meant we couldn’t enter and had to shoot from outside the fence. The client, kind and hospitable from the start, however did find us a ladder to take some photos over the fence and from top of an adjacent building.

SHOOT 2
HOWLING WINDS!

26 MW Wind Power Plant - CESC Ltd.

MA: The next day at the next site, the sky was overcast, but the photographer assured us the dull light gave better contrast when shooting the tall grey turbines. Something else we learnt was; until you are on a wind farm, you don’t realise how far apart the turbines actually are; making them difficult to photograph together. We got some individual turbine shots, always looking for Indian elements - sheep, indigenous cactus and even a rare, ancient stone temple to add local flavour to the photos. Naturally wind farm sites are in windy areas; but with a storm coming the wind force was so strong we could hardly stand. We’d only just got the shots needed when the torrential rain began - trapping us in the site office for hours. When we finally ventured out, our car had been flooded and wouldn’t start! Getting back to the hotel much later, the news was the storm had caused several deaths in the area, so we were glad to be safe.
SHOOT 5
A “VERY WARM” WELCOME

2X350 MW Thermal PP - Meenakshi Energy (ENGIE)

VS: Heading far south to Chennai by plane via Mumbai, torrential rain was once again threatening - but again we made it without incident. From Chennai we still had to go to Nellore in the next State of Andhra Pradesh. There, we felt we were back with “family”, as our colleagues residing in company accommodation treated us to a fine South Indian breakfast, before helping us get port access and onto the site. Again we received Health & Safety induction and our PPE gear - along with strict instructions as to what we could and could not shoot. Compared to the other sites this site is vast and much more European in its organisation - moving around we were carefully guided and warned to take extra care because of the loose soil underfoot. It was also so hot after the north and in minutes we were all soaking due to the humidity. But we had fantastic sunlight and “top” photo opportunities - one which involved the photographer, safely harnessed, going up inside a 275 m chimney to shoot the view - the rest of us politely declined!

SHOOT 4
NO CORNER UNPHOTOGRAPHED

5X270 MW Thermal PP - Indiabulls

MA: By now we were in a different State. I’d previously worked on this plant so had good customer contacts and it was interesting to see the plant again with eyes different from a Lender’s Engineer preparing site and progress reports. They allowed us to photograph every aspect of the plant from water intakes to the coal stock piles and more from various elevations - including from on top of the 90m high boiler platform! It was a successful day all round, even for the client for whom we managed a few shots of his new state-of-the art control room as a thank you.

“Visiting sites is not new to me as an engineer and we often snap photos to show a projects progress or completion, but never thinking about contrast, light, which way you are facing etc. Having worked mainly on Thermal Power Plants it was great to visit wind and solar plants and talk “technology” with the clients. I learned a lot about photography and renewables at the same time!”

Mohd Arif - Mechanical Lead Engineer, Tractebel Engineering India
STRONG WIND TO THE WEST

A FIRST OE CONTRACT IN BRAZIL
Francois-Xavier van Innis: A few years ago we opened a new Renewable Energy Business Unit in LEME Engenharia, the Brazilian subsidiary of Tractebel Engineering, in the city of Rio de Janeiro to focus on developing biomass, solar and wind business in Latin America. In wind we’ve already carried out an Owner’s Engineer mission in Peru (Crossways 23), but ITAREMA 207 MW Wind Farm is our “first-of-its-kind” most comprehensive Owner’s Engineer contract (site supervision of civil, electrical and wind turbine generator works) in Brazil. It’s very inspiring for the team to be back in action in one of the world’s strongest wind regions; Ceara in North East Brazil…

ITAREMA 207 MW Wind Farm is located on the coast, 200 km north of Fortaleza and 4 km from the town of Itarema - one of the windiest places in Brazil famous for kite surfing and wind farms. The project site covers 1,219,40 ha allowing placement of 69 turbines of 3 MW each. The mission began in June 2015 and is due to complete in July 2016 - just 13 months!

WHEN A NAME FOR QUALITY MATTERS…
Due to the high wind velocities, wind is very developed in this region and competition for consulting jobs is as fierce as the winds that blow here. As wind is becoming less demanding of specialised expertise than some other renewable sectors, it’s been difficult to play our “expertise” card to win business and we’ve had to be very market oriented in terms of our offers. That said, LEME Engenharia’s good name for quality engineering has worked to our advantage in this tender.

Our client is Rio Energy; a large, quite new Brazilian developer in wind. Their objective is to develop, finance, construct and operate good wind projects. So for them original quality is important. We presented a very competitive bid; combining 3 lead engineers from LEME Engenharia, with a team of technicians hired locally from the Ceara region - but, I believe, Rio Energy also calculated the value our name would add to the project. It’s a good win and further opportunity to build our expertise and competitive presence in the market.

HIGH SPEED & STRONG WINDS AHEAD
The challenge on this project is planning and quick response. The schedule is very tight and the first clue as to how fast we’d need to move was the client wanting the team mobilised within 2 weeks of signing. Construction is also moving at an exceptional pace. Access roads and foundations for turbines, electrical stations and transmission components are being worked on all at once right across the site. As one lot of foundations is set, turbines are being erected while the next batch of foundations are worked on. Another challenge is the wind strength - great for wind farms, difficult when erecting turbines - so we need to focus on this in the very early mornings when the wind is slightly calmer. It makes planning complex, but an area where we can add real value and grow our reputation with a strong team on site.

When a name for quality matters… Wind power, one of the “heroes” of renewable energy, is blowing strong worldwide; giving our international teams opportunities to spread their wind wings into new markets. 3 new Owner’s Engineer contracts in Brazil and Thailand show they are flying high….
PROMISING WIND TO THE EAST

A STRONG PUSH FOR WIND IN THAILAND

Mathieu Cornet: On a similar Renewable Energy push, I joined the Thailand office two years ago to evolve the business in this region. This ties in well with Thailand’s power development plans that call for a 2 GW share of power to be delivered by wind by 2021. While wind speeds in the region are average, addressed with the right technology like taller and larger diameter wind turbines etc., the projects are bankable and developers are lining up...

As a result, Thailand now has at least 235 MW existing in wind and around 5 new wind farms under construction (including the 2 we are working on as Owner’s Engineer). And there is a flurry of other project proposals by developers. So we are definitely in the right place at the right time. But there is also a lot of competition from other consultancy companies present in Thailand, so winning 2 early contracts and being among the first to gain concrete references and on-the-ground experience with Thai wind developers is a real breakthrough for Tractebel Engineering.

TWO NEW OE CONTRACTS UNDERWAY IN THAILAND

KHAO KOR 60 MW - Wind Farm is in Phetchabun Province, on a plateau above quite a busy tourist spot. The project will host 25 turbines with 120 m rotor diameter delivering 2.5 MW each.

The project was awarded late 2014, began early 2015 and is due to complete in June 2016 - in 16 months!

Our Khao Kor client is a developer consortium formed by Charoen Energy, Wind Energy Holding and Demco (also the EPC contractor). The contract was awarded through competitive tender based primarily on our ability to provide local experts, backed by proven international wind expertise. The site location, in undulating territory and on a plateau, has presented the biggest challenge to date as the steep road section up to the site has needed enlarging to allow the turbine transport etc. The rainy season was a further challenges to the site roads. Lastly, the fact that tourist traffic has to be minimally interrupted is another small obstacle to overcome in the upcoming months. But on the whole we are working with strong clients and there is no reason for the project not to be a success.

CHAIYAPHUM 80 MW - Wind Farm in Chaiyaphum Province, is in central Thailand about 250 km from Bangkok. The project will host 32 turbines with 120 m rotor diameter delivering 2.5 MW each.

The project should complete by the end of 2016 - but an early target of September is a goal…

Gaining the Chaiyaphum wind project very shortly after Khao Kor, was an unexpected bonus win! We were directly approached by our client EGCO (Electricity Generating Public Company - Thailand’s first Independent Power Producer), thanks to its positive experience of working with Tractebel Engineering in thermal power. When we were then able to offer a good, benchmarked market price - the Chaiyaphum Owner’s Engineer job was ours!

TIGHT TEAMWORK

Both Thai projects have a similar scope and team structure. We are responsible for detailed design review through construction supervision and commissioning, with the added task of factory and ex-works inspections in China and Germany. On both, we have Thai teams providing project management, electrical, civil and BOP expertise with deep insight of the local context and on call support from overseas specialists. A team of 4 inspectors is allocated to each project site, supported by an international wind turbine expert. We also welcomed Sorin Dovancescu from Romania for 3 months and his valuable advice on turbine foundations. Last but not least, internal and external resources from China are supporting the quality inspections. Another good international team effort that will give a clear signal to prospecting developers in South East Asia that Tractebel Engineering can add value to wind - and all renewable efforts!
HYDRO BORDEAUX

From 26 to 28 October 2015, we participated at the HYDRO 2015 International Conference and Exhibition at the Bordeaux Convention Centre in France. Up to 1400 delegates from 90 countries attended the event, making it the most important international gathering of the year for the hydropower industry.

Speakers from both Lahmeyer International and Tractebel Engineering (France) presented technical papers on a number of topics, highlighting our joint and vast expertise in this domain. Some of the projects introduced to attendees were the 900 MW Baglihar scheme stage I and II: geotechnical engineering of the powerhouse complex; the Role of pumped-storage in a pan-European supergrid and the Kaléta hydropower project featured in this Crossways issue pg. 11.
The Mahawali Water Security Investment Program is a vast water conveyance project aiming to transfer water, primarily from the abundant Mahaweli River, all the way to the country's most northern and north-western dry and drought-prone zones. The gravity-driven scheme, involving a complex network of reservoirs, hydropower dams, kilometres of underground tunnels and open canals, will disperse water all along the route, mainly for rice paddy irrigation, drinking and commercial use; boosting crop yields and accelerating national economic growth. Its completion over 10 years is an enormous investment, but a key priority of the government.

Lahmeyer won the contract as Program Management Design & Supervision Consultant (PMESC) assisting the Sri Lankan government with the full 5-year Phase 1 implementation and realisation, as well as preparations for a Phase 2 implementation. Extending the contract beyond 5 years is an option for later discussion, but for now there is more than enough to keep Lahmeyer busy as Phase 1 presents major construction and consulting challenges, involving:

- Minipe Left Bank Canal Rehabilitation Project (MLBCRP), downstream of the Mahaweli Hydro Power Complex: heightening the headwork weir, installing intake gates, spill weirs and rehabilitation of 74 km of canal.
- The many tunnels and irrigation canals involved in the Upper Elahera Canal Project (UECP); one these - a 9 km transfer canal linking Moragahakanda and Kalu Ganga dam/water storage reservoirs under construction - will involve 8 km of tunnel, 300 m below the surface in places. Another, 26 km long, 8 m in diameter and about 150 m under the surface to avoid impacting a nature reserve and elephant sanctuary - will be one of the world’s largest water tunnels. Plus around 80 km of canals extending northwards from Moragahakanda to other existing reservoirs.
- The North Western Province Canal Project (NWPCP) with 96 km of new and upgraded canals, including a 940 m tunnel and two new 25 m earth gravity dams.

Effective implementation of all the investment program’s outputs covering:
- Program Management - overall investment program coordination, schedules, planning and management through all the relevant agencies.
- Capacity Development and Training Implementation - a broad program of Procurement support, competence building and training of key stakeholders.
- Communications - managing all public communications during implementation of the investment program and preparation of Phase 2.
- Preparing a Strategic Environment Assessment (SEA) - a full assessment related to the programme and other ongoing and planned investments.
- Preparation of Phase 2 - studies, route assessments for transferring water from the Mahaweli River to Moragahakanda reservoir, tender and contract preparations for the remaining elements: 3 more dams, HPP stations and a lot more canals and tunnels…
- ISEWP - the allocation and supervision of a separate consulting package focussed on: improving system efficiencies and water productivity.

Michael Chegwin, prior Department Head: Sustainable Water and Land Resources Development in Germany, has stepped in to lead Lahmeyer’s mission - a task equivalent to setting up a brand new company! The team, involving over 100 specialists (40 international consultants, 60 national consultants) plus support staff for four design offices, begin mobilising in and to Colombo, Sri Lanka from December 2015.

More information: Dr Beau Freeman - Department Head: Sustainable Water and Land Resources Development - Lahmeyer International - Beau.Freeman@de.lahmeyer.com

Lahmeyer International has just signed a contract with the Sri Lanka Government, approved by the Asian Development Bank (ADB), as Implementation Consultants for a major-league water transfer programme! A project we’ll be watching take shape for years to come…
A HIGH-POWER VISIT
NOUAKCHOTT WIND FARM

Sharing celebrations of Mauritania’s 55th anniversary of independence, on 24th November 2015, the country’s first large-scale wind farm - Nouakchott 30 MW was inaugurated by President Mohamed Ould Abdel Aziz. The wind farm is an ambitious step realised towards the renewable energy orientation of Mauritania’s growing energy sector (Crossways 24).

Since grid connection in May 2015, Nouakchott Wind Farm has produced over 30 GWh. For Tractebel Engineering, signed as Owner’s Engineer in 2012, it has been a real pleasure to see, having assisting its client, state utility SOMELEC, throughout all phases of this challenging project. Damien Alen, Project Manager, says: “We’ve built a very close and strong relationship which will help in future to reinforce our position as a leader for the development, realisation and commissioning of all energy projects in Mauritania, including ongoing assistance to SOMELEC during the guarantee period in which a production of more than 110 GWh/y can be expected.” Congratulations to our team and partner, BETGP, for their high quality work!

“Renewable energies, such as wind & solar, are an absolute priority in the sustainability strategy for the Mauritanian authorities. We plan to increase renewable energies between 2015 and 2018 from 26% to 39%”.

Mohamed Salem Bechir, Minister of Petrol, Energy & Mines, Mauritania
Tractebel Engineering participated in some more important conferences in Paris during the last few months, namely World Efficiency, EWEA and the COP21.