

#62

Information on
Tractebel Engineering GmbH
August 2019

aktuell

ENERGY

Bangladesh

Smart Grid: Technology
Breakthrough

HYDRO &
WATER

Egypt

New Assiut Barrage and
Hydropower Plant

BUILDING &
TRANSPOR-
TATION

Germany

Return of Berlin's Stadt-
schloss to former Glory

Tractebel - a leading
Offshore Wind Player



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Title image:

Construction of an offshore wind farm platform in the Baltic Sea (see article on pages 8 and 9)

Editorial

Dear Readers,

We are very happy that you have devoted your time to the new edition of our magazine "aktuell". This edition is the first to be released under the umbrella of the Tractebel brand. As an important part of the Tractebel Group and member of the worldwide ENGIE family, Lahmeyer is consistently following the path of integration and has also been demonstrating this since the start of the year with its new name.

As one company, **Tractebel** wants to support its customers as partners! Lahmeyer International is now called Tractebel Engineering GmbH and continues to work closely with the other international companies of the Tractebel Group. Likewise, our company for urban water management GWK Consult will shortly be renamed Tractebel GWK GmbH.

Another longstanding collaboration is with Lahmeyer Hydroprojekt from Weimar, which rebranded in March as Tractebel Hydroprojekt GmbH. We will continue to rename our international companies step by step.

In July, our Russian branch was renamed OOO Tractebel Engineering. Our two new offshore companies have also already been named Tractebel Overdick GmbH and Tractebel DOC Offshore GmbH.

Yes, you read right. We have acquired Overdick and Deutsche Offshore Consult DOC, two companies from the offshore wind sector. We now offer our offshore customers a wide range of services from a single source. As announced, we are growing in this important sector and have since doubled our turnover for wind projects.

Another important goal of our strategy is to grow in the fields of energy, water and infrastructure in Germany and the DACH region. As a very successful international player in the energy transition, we are in the ideal position for this. We plan to expand our activities in major projects in Germany.

Africa is and will continue to be an important continent for us. It is crucial for Europe to support the prosperity and associated development of the infrastructure



Martin Seeger
CEO of Tractebel Engineering GmbH

there. Energy and water projects play an important role in this, which we execute with our Tractebel experts. Sustainable water management also remains one of the most pivotal challenges for food security. Our company makes an active contribution to important international projects focused on this issue in Africa, and Asia too.

Since the last edition, we have put our announcements into practice and made new plans for our future. The articles in this edition will inform you of our various experiences and demonstrate our high level of professional expertise. Get a feel for the passion of our employees in the implementation of our vision!

Happy reading!

Sincerely Martin Seeger

Lahmeyer is now Tractebel

REBRANDING

Since 31 January 2019 our company has been operating under the brand of our parent company Tractebel. What was formerly Lahmeyer International GmbH now goes by the company name of Tractebel Engineering GmbH. Lahmeyer Hydroprojekt GmbH has been called Tractebel Hydroprojekt GmbH since March 2019. And since July 2019 our Russian company OOO Lahmeyer International Rus has been operating as OOO Tractebel Engineering. GKW Consult GmbH will shortly be renamed to Tractebel GKW GmbH. Other companies are to follow.

One Company – one Brand

“This is how we want our customers to see us: ONE global company which shares the same values and delivers the same high-quality engineering and consulting services worldwide.”



says Tractebel CEO Olivier Biancarelli in his message to our staff.

The Lahmeyer Group was acquired by Brussels-based Tractebel back in 2014. Our company is one of the leading international engineering and consulting companies, which has over 150 years of experience of operations in energy, water, hydropower and urban infrastructure projects. In 2018 Tractebel recorded sales of Euro 675 million with a workforce of around 5,000 employees in over 30 countries.

As an active driver of the energy transition, Tractebel offers comprehensive engineering and consulting services covering the entire life cycle of its customers’ projects, including design and project management. Our company is part of the global energy and service company ENGIE.

The Lahmeyer Name continues

The integration of Lahmeyer in the Tractebel organisation was carried out over the course of the last four years. Our customers such as development banks, energy ministries and water and energy supply companies throughout the world benefit from the combined strength of the Tractebel Group.

Given the outstanding reputation of our former Lahmeyer brand, the phrase *“With the trusted expertise of*

Lahmeyer International” is added to our company’s documents and communication media.

We have communicated this message about the renaming to our customers and partners by letter, in social media and the press. For our customers and partners nothing changes. All contractual rights and obligations remain unaffected.

Times of Change

Some 150 staff at Lahmeyer’s head office in Bad Vilbel and guests from the Tractebel Group paid tribute to this important step for the future of our company in a celebratory rebranding ceremony.

In his ceremonial address, Managing Director Dr. Thomas Brandstätt took a look back at the history of our company. He showed how important



Managing Director Dr. Thomas Brandstätt at his ceremonial address

changes have been and are for our company in order to be successful in changing markets. *“Our new name Tractebel is a symbol of the change that Lahmeyer is experiencing. Change that is essential, to be able to survive in an age of globalisation, digitalisation and disruptive markets,”* said Dr. Thomas Brandstätt.

Forward together

The gains that our company, with its staff, performance and references, bring to the Tractebel Group, and the synergies that we create together, will bring dividends for our customers and partners in Germany and throughout the world.



Employees from the various departments and business units demonstrate their team spirit and successful cooperation within the Tractebel family every day – to the benefit of our customers, our partners and our staff. We look forward to continuing our successful working relationships!



Above: The string players of the Ensemble La Finesse provided the musical framework for the event.

On the left: Etienne Jacques conveyed greetings from CEO Olivier Biancarelli and welcomed the employees to the Tractebel brand family.

Right and below: Impressions from the Rebranding Ceremony.



Tractebel blogs – Insights, Experiences and Expertise

ONLINE MEDIA

We have been blogging for over a year at blog-tractebel.lahmeyer.de. More than 30 employees report on interesting experiences and exciting projects from the fields of energy, water and hydropower, IT services and cyber security. The “Life at Work” section invites readers to immerse themselves in the world of our bloggers’ work.

Project Work up close

Visit our blog and take a peak behind the scenes. Get to know people and take a look over their shoulders as they work on projects. If you like, you can follow a young engineer on her exciting [mission in Angola](#). In her blog post, she takes the reader along to the construction site of the Laúca hydropower plant. In addition, one of her colleagues explains the rather unfavourable conditions of a due diligence project he assisted with for a [power plant in Pakistan](#). Experience how our experts design an energy [master plan for six African countries](#). Or dive into the discussion on “[Is Hydrogen the solution?](#)”.

Latest Tips

Every blog needs to include a few useful tips! The blog team is always keeping an eye on innovative energy and water issues and provides site visitors with information with added value. For example, readers learn what companies need to watch out for when introducing an [information security management system](#) (ISMS) or how power plant operators can optimise the [cyber security](#) of their plants.

The Tractebel web diary is informative, entertaining and helpful. All interested parties are invited to sign up for the [blog newsletter](#). This means they are always kept up to date and immediately alerted when there are new blog posts on interesting specialist issues.

Have a look: blog-tractebel.lahmeyer.de



Visitors of our blog get to know our employees and their projects



(from left) Martin Seeger, Prof. Dr. Adriano Freire und Stefan Quandt

A Visit to Tractebel

Hessischer Kreis

On 31 October 2018, the friends of the “Hessischer Kreis” visited our company in Bad Vilbel. Tractebel Germany CEO Martin Seeger greeted the around 100 entrepreneurs and executives from Hessen as well as guest speaker Prof. Dr. Adriano Freire from Lisbon, President of the EGOS Institute and Professor at The Lisbon MBA. His presentation on the development and implementation of personality-based systems in companies such as EGOS Map was very well received. The Deputy Executive Board Chairman of the “Hessischer Kreis” Stefan Quandt, who is Chairman of the Supervisory Board at Delton AG, moderated a lively discussion.

NUMOV

The topic of “Business opportunities in the Near and Middle East” was the focus of the event in Bad Vilbel on 15 July 2019. Helene Rang, Managing Chairperson of the Near and Middle East Association (NUMOV), and Martin Seeger, CEO of Tractebel Germany, warmly welcomed the participants. Jörg Ranau, German Ambassador in Saudi Arabia; Yasser Ibrahim, ODDO BHF Bank AG; and Ingolf Hoffmann, Executive Director Energy Division of Tractebel, reported on engagements in the interesting economic region.



Helene Rang moderating

Successful environmental Certification according to DIN EN ISO 14001

CERTIFICATES

The growth of environmental awareness and the public interest have an impact on business activities. The demand for environmentally-friendly products and socially responsible companies and organisations has gained in importance.

With the introduction of an environmental management system in accordance with DIN EN ISO 14001, Tractebel Engineering GmbH will be promoting environmentally-friendly and culture-friendly sustainable development and continuously improving its performance in this area.

Potential for Improvements

Our staff are increasingly identifying areas with potential for improvement in our environmental management system. For example, we take advantage of the opportunity to cut electricity consumption. Even the little things like programming our network printer to print double-sided contribute to the conservation of resources.

The reduction of CO₂ emissions when travelling is also a key goal. This means that we are making increasing use of public transport and making more and more business trips within Europe on the train, instead of flying or driving. As an alternative to business trips, we are also able to conduct some meetings by means of video or telephone conferences.



TÜV Audits successful

The normative preconditions for certification in accordance with DIN EN ISO 14001 at the Bad Vilbel site had been established by the time our company successfully completed a pre-audit in early September 2018. At the end of September, the external auditors from TÜV Hessen paid another visit to Bad Vilbel. In the initial certification procedure, Volker Rühl, Environmental Manager at Tractebel Engineering GmbH, presented all the required documents. In addition, project managers from the Energy business unit presented two projects with special environmental aspects.



Volker Rühl is Environmental Manager at Tractebel Engineering GmbH and prepared the audits for the certification of our environmental management system.

“The introduction of the environmental management system in accordance with DIN EN ISO 14001 means Tractebel will be promoting environmentally-friendly and culture-friendly sustainable development.”

DAkks Accreditation

In 2018, the Deutsche Akkreditierungsstelle (German Accreditation Body [DAkks]) renewed Lahmeyer International's (now Tractebel Engineering GmbH) accreditation for the preparation of energy yield reports for wind energy projects. Banks attach great importance to yield reports under this certificate. This benefits our customers in the financing of their projects.

A wind energy yield report assesses the potential energy yield of a planned wind energy plant or wind farm. In the process, Tractebel also calculates technical losses as well as the probability of the yield occurring. These factors can then be included in the customer's profitability calculation in order to determine the financial yield. Accreditation gives the customer the assurance that Tractebel has compiled the energy yield report on a standardised basis and to a high quality.



Senior Project Manager
Jürgen-Jacob Reich:

“The DAKKS accreditation provides our customers with a significant advantage by reducing the risk in terms of their profit forecast. This is also valued by international financial institutions, who accept our reports as the basis for the financing of wind energy projects.”



Tractebel becomes a leading Offshore Wind Player with Overdick and DOC

ACQUISITIONS

With two acquisitions in the second half of 2018, Tractebel has continued to focus on growth. As a leading consulting and engineering service provider for future energy, Tractebel acquired the successful offshore engineering company Overdick in September. A few weeks afterwards, Tractebel acquired a majority stake in Deutsche Offshore Consult GmbH (DOC). These acquisitions will strengthen and solidify Tractebel's position in the offshore sector.

Overdick becomes Tractebel

With the signature of the share purchase agreement on 7 September and the closing of the transaction in the end of September 2018, the acquisition of Overdick GmbH was sealed. To signify the integration into the Tractebel Group, the Hamburg-based company in Germany was renamed Tractebel Overdick GmbH.

An experienced Specialist

Founded in 2000, Overdick is one of the leading specialists in modern offshore engineering and design, maintenance and inspection services. The company offers a wide range of services within the areas of offshore wind, offshore oil and gas, naval architecture, marine operations, platform removals and salvage. We



The North Sea jack-up vessel is designed for operations in water depths up to 50 m

will benefit from Overdick's far-reaching experience in detailed design, construction, transportation and installation of wind turbine and offshore high voltage substation foundations.

Impressive References

The design of the heavy lift jack-up vessel INNOVATION, the overall design execution of most of the HVDC platforms in the German North Sea, and the design of the MOAB® self-installing platforms for worldwide wind farms and oil & gas production are impressive project references by Overdick. They include engineering and site supervision of the COSTA CONCORDIA wreck removal project off the coast of Giglio, Italy.



Overdick's Managing Director Andreas Rosponi:
"Bringing in an independent offshore engineering firm like Overdick will be a great step forward for the growth potential of the Tractebel Group and will offer clients a wider portfolio of services in the future. The pool of skills has significantly increased overnight."



Dolwin Gamma HVDC Platform during the installation of the topsides



Removal of the Costa Concordia, Giglio, Italy

DOC becomes Part of the Group

The acquisition of a majority stake in Deutsche Offshore Consult GmbH (DOC) on 5 December 2019 is a further milestone for Tractebel to strengthen and solidify our position in the international offshore sector. Founded in 2009, DOC is based in Bremen and Bremerhaven in Germany and has extensive project experience in all phases of an offshore wind project. The company's engineers, geographers, logistics and offshore experts oversee all main and crucial sub works.

Everything for Offshore Projects from a single Source

The company's areas of expertise are a logical addition to the range of services offered by Tractebel. With this acquisition, Tractebel will offer its customers all relevant technical expertise from a single source. Our specialists provide project support from planning to engineering, operative implementation and operational management for any project phase.

The wide range of services offered by DOC also includes optimising the management of installation- and service-vessels along with the preparation of port infrastructure. All services focus on effectively reducing the implementation risk of each project.



Rotor loading in Wilhelmshaven

High Level of Offshore Expertise

DOC has been involved in numerous German offshore wind projects over the past few years. References include projects in the North Sea and Baltic Sea such as Butendiek, Amrumbank, Merkur, Trianel Borkum and Borkum II, Global Tech I, Baltic I, Baltic II, alpha ventus, BARD Offshore I and various offshore service stations. Internationally, DOC has worked on the Neart na Gaoithe (UK), Gemini (NL), Cape Wind (USA), Fécamp (F), Saint Nazaire (F) and others.



The offshore wind farm alpha ventus in the German Bight, North Sea

Olivier Biancarelli, CEO of Tractebel:

"The two acquisitions made by Tractebel in the offshore segment within just a few weeks demonstrate that we are rigorously pursuing our growth strategy to become the leader in offshore wind engineering and a global player in future energy."



CEO of Tractebel Engineering GmbH Martin Seeger und Managing Director



Dr. Thomas Brandstät:

"With DOC, we are gaining additional expertise in fields which are key for the successful completion of offshore projects. Our customers will benefit in particular from this wide spectrum of services, which we will be able to offer from a single source in the future."



DOC Managing Directors Oliver Spalthoff and Jörg Engicht:

"For DOC, the participation represents the logical step towards strategic growth through internationalisation and the expansion of expertise. We are looking forward to pooling our expertise with Lahmeyer and Tractebel and together becoming an even stronger partner in the national and international offshore wind industry."



Engineering and monitoring the loading of offshore components in Bremerhaven

Trade Fairs and Conventions 2019 – Where to find us

EVENTS

In recent weeks and months, our company has been presenting its services and communicating the new company name at a variety of trade fairs and conventions. We have provided updates on these events in social networks and on our website tractebel-engie.com.

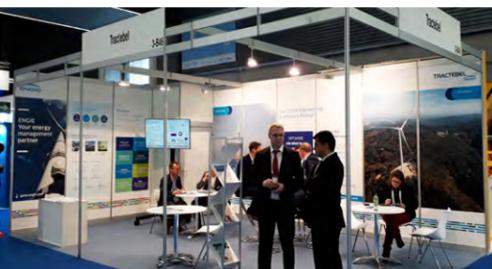
ASEAN Wind Energy

At the beginning of April, the ASEAN Wind Energy Conference invited around 800 experts from around the world to Ho-Chi-Minh City. As an expert in smart grid technologies, Dr. Ralf Bucher (photo), Head of the Power Grids & Systems department, took part in a podium discussion on the topic of "Pioneering Smart Grids for Energy Efficiency".



WindEurope 2019

In early April, Bilbao was the epicentre for the exchange of knowledge in the wind energy sector. Tractebel presented its services at a stand at the fair. In both the exhibition and the conference presentations, participants at WindEurope 2019 experienced the key figures in the industry who are in the front line of networking important players in the energy transition.



VDI Recruiting Days

Just how diverse and fascinating working at Tractebel is was experienced by the large number of visitors to the recruiting days held by VDI in Mannheim and Frankfurt this year. The prospective job applicants updated themselves on opportunities and tasks awaiting enthusiastic engineers at Tractebel. Insights into international projects were also provided by Dr. Ralf Bucher, Florian Höllerhage (photo) and Dr. Patric Kleineidam in the company pitch. Tractebel plans to participate in other VDI Recruiting Days. Visit our stand in Darmstadt on 27 September or in Karlsruhe on 10 October!



World Bank Energy Week

The World Bank invited international experts to meet in Washington DC on 7 March 2019 to discuss the latest developments and trends in the field of hydropower. Dr. Ralf Bucher (photo) took part in a podium discussion about the growing requirements for hydropower plants due to the integration of renewable energy.



Hybrid Expertise in Crete

From 22 to 23 May 2019, over eighty international experts gathered in Heraklion to discuss their experiences at the fourth International Hybrid Power Systems Workshop. François Botreau (photo) presented Tractebel's innovative approach to the development of hybrid systems for rural electrification projects in mini network environments.



IRES Energy Conference

How will we store energy from renewable sources in the future? Tractebel specialists are working intensively on this key question for the energy transition. They presented their findings at the 13th International Renewable Energy Storage Conference (IRES) in Düsseldorf in March. Conference delegates followed the explanations provided by Louis Bahner (photo) who, together with Achim Schreider and Dr. Ralf Bucher, is investigating innovative approaches in energy storage.



FILDA Angola

From 9 to 13 July, the international multi-sector trade fair FILDA took place in Luanda, the capital of Angola.

Tractebel participated in this event with a stand at the German Pavilion. In addition to presenting prestigious reference projects (e.g. construction monitoring of the 2,070 MW Laúca hydropower plant), this was a chance to engage in numerous discussions with interested trade fair visitors.

Daniel Günther, the President of the German Bundesrat, attended FILDA on 13 July 2019 along with a political and business delegation as part of a commerce reception.



ICOLD in Ottawa

Dams and hydropower were the focus of the ICOLD annual meeting 2019 (International Commission on Large Dams) held in the Canadian city of Ottawa in June. Experts from France and Germany represented Tractebel in a series of Technical Committees. Karsten Thermann and Dr. W. Riemer presented a report on "Diversion Tunnels - Risk Management Confronting Multiple Hazards".

Together at the KONTEC

For the 14th time, the world's key players involved in decommissioning of nuclear power plants came together for a conference. The KONTEC Symposium "Conditioning of Radioactive Operational & Decommissioning Wastes" invited delegates to the Congress Center in Dresden for three days at the end of March. Tractebel, ENGIE and Tecubel were represented on a joint stand at the fair, where they presented their range of services in this challenging field.



HYDRO Africa

Namibia was the meeting place for professionals in the water and hydropower sectors from 2 to 4 April. Africa 2019 - the regional conference focused on water storage and the development of renewable energy in Africa - was an opportunity for Tractebel to showcase its internationally leading position in the hydropower industry.



German Symposium on Dams and Reservoirs

In early May, Tractebel participated in the 18th German Symposium on Dams and Reservoirs in Leipzig. The event is held by the German Dams and Reservoirs Committee (Deutsches Talsperrenkomitee e.V.) every three years to bring together German and international water resources and hydropower experts. Tractebel Germany presented its experiences with eight contributions in total. Congress delegates had the chance to immerse themselves in the virtual reality of BIM projects at the Tractebel stand.

Planned Trade Fair Dates

Tractebel will be participating in two more trade fairs this year. We will announce further details on our website tractebel-engie.com/en/events. We look forward to meeting you!

14 - 16 October 2019	Hydro 2019, Porto, Portugal
26 - 28 November 2019	WindEurope Offshore 2019, Copenhagen, Denmark

10 Years of Success in Russia

RUSSIA

More than 10 years ago, in February 2009, five energy experts commenced work in the newly established company Lahmeyer International Rus in Moscow. Now, despite difficult market conditions, our Russian company has successfully implemented more than 45 conventional energy projects. With a growing number of employees and a turnover of €800,000, 2018 was the most successful year in recent company history. In July of this year, our Russian company based in Moscow was renamed OOO Tractebel Engineering.

The first projects included cost estimates for the construction and maintenance of new power stations in Russia for the Association NP Market Council and a pre-feasibility study for the construction of a 600 MW SCPP power plant in Siberia for TNK-BP. Our Moscow-based colleagues have now gained a considerable number of further customers, including the Russian Ministry of Energy, for which the experts carried out calculations of heating costs in 2018 on the basis of government decree no. 1562.

Performance honoured

At the company anniversary, Managing Director Yuri Istomin honoured the performance of his staff, who have always given their best even in tough times. The Director of the Tractebel Business Line Energy Michael Wünnemann spent many years supporting the Russian company as Executive Director Energy Division of Lahmeyer International. In his welcoming speech, he praised the positive development in joint working relations over the last 10 years. In his ceremonial address, CEO of Tractebel

Engineering GmbH Martin Seeger focused on how collaboration with the Russian company will continue to shape the Tractebel Group in the future.

A Boat along the Moskwa River

In February, the team celebrated on a boat which took a trip southwards along the Moskwa from the centre of Moscow. In keeping with Russian traditions, toasts to continued success were made during the banquet.



The team celebrates its 10-year anniversary

Moscow by night



(from left) Michael Wünnemann, Martin Seeger and Yuri Istomin

Study paves Way for Modernisation of Power Plants in Russia

RUSSIA

With its know-how, Tractebel (formerly Lahmeyer) has been assisting Russia for many years in the construction and rehabilitation of power plants. Already in 2009 the expansion study by Tractebel energy experts contributed to power sector development. The most recent study formed the basis for the Russian Government Decree in early 2019. The aim is to modernize existing power plants.

The state programme DPM was launched ten years ago to support the energy sector and is almost completed. The findings of the first Tractebel study made important contributions to its success.

The results allow for the estimation of construction costs for new thermal power plants anywhere in Russia. The respective output must be considered as well as fuel type (coal, gas) and technology (steam, combined cycle, or gas turbine power plants).

The climatic and seismic conditions are also included in the calculation.

Reliable Calculation for Investments

Investments are now focussing on modernisation and rehabilitation of existing power plants. The retrofitting measures can extend plant operating life by 15 to 20 years and increase environmental compatibility. In line with these tasks the Russian Ministry of Energy contracted local Tractebel experts in 2018. The experts

identified the modernisation options for the main power plant equipment and systems and developed a cost calculation tool.

Government Decree No. 43 adopted and published on January 25, 2019 regulates the approval procedure for investments in the thermal power plant modernisation programme (DPM-2). In May 2019 the first tenders were launched in which generation companies submitted their power plant modernisation projects.



A large number of Russian thermal power plants require modernisation. A study by Tractebel identifies options.



Smart Grid: Technology Breakthrough in Developing Country

BANGLADESH

Power generation from renewable sources is on the rise worldwide. The transition towards zero-carbon electricity supply requires – apart from renewable generation facilities – an upgrade of the transmission and distribution infrastructure. To cope with the enhanced requirements driven by variable infeed, next-generation telecommunication systems and network automation are required.

The structure of most transmission and distribution grids was designed for the requirements of large and centralized generation facilities. Today, power generation by variable sources increasingly influences the operation of the electricity grids. Massive upgrades are necessary to ensure efficient and stable supply also in the zero-carbon scenario.

The Mission

In September 2018, KfW selected Tractebel to perform a feasibility study for the upgrade of the regional network in western Bangladesh. The project is the first-of-its-kind financed by the German development bank in the region.

Bangladesh has a population of 165 million. With 1,225 people/km² it is one of the world's most densely populated countries (Germany: 231 people/km²).

The existing distribution network infrastructure is not up to the current and future requirements. Reasons for this are a 10 % increase of demand per year, high network losses, outdated primary and secondary equipment in substations, frequent outages with long repair times and inefficient operating structures due to the completely manual operation of the network.

Scope of Services

A unique aspect of this project is that the investments were assessed and prioritized based on highest GHG



Knowledge transfer by integrating the customer into the digital modelling process

reduction potential, as opposed to traditional cost benefit analyses.

The Team carried out two main tasks:

(I) Network Analysis

With the help of state-of-the-art network calculation software, a precise digital model of the existing electrical distribution system was created for the first time. The specialists of the customer (West Zone Power Distribution Company Limited) were involved to ensure a long-term successful knowledge transfer.

(II) Distribution Management System

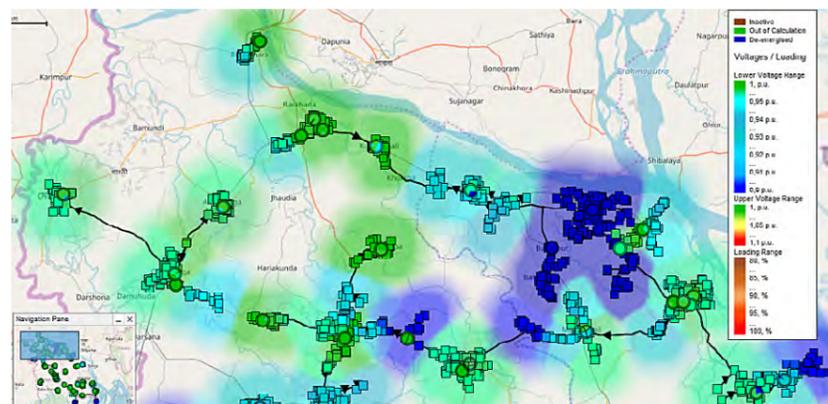
Tractebel assessed the possibilities of re-structuring the network operation and to establish a regional control center including a modern SCADA system for distribution networks. In addition, a reliable telecommunication concept has been developed for the substations in the distribution networks to the control center.

Result

The project contributes to higher reliability and efficiency of the region's distribution system. The establishment of modern distribution grid automation is expected to significantly reduce outage times and reduce annual operating costs by more than 60 %.

The initiative brings a giant leap in progress by deploying latest digital technology in a developing country.

Voltage profile calculation



Hybrid Power Plant protects tropical Paradise

ECUADOR

The Isabela hybrid power plant on the Galapagos Islands has been operating successfully since October 2018. In line with the Ecuadorian Zero Fossil Fuel Initiative, it reduces the carbon footprint of the island's electricity generation. Tractebel acts as Owner's Engineer for the Ecuadorian Ministry of Energy until the end of the warranty period. Tractebel has recently conducted a feasibility study for the expansion of the hybrid power plant.

Ecuador is pursuing ambitious goals to protect the unique flora and fauna of Galapagos. In 2008, the government made a forward-looking decision to replace all fossil fuels on the island by 2020.

Therefore, the energy generated by the new hybrid power plant comes predominantly from renewable sources. This is achieved by a photovoltaic system and generators operated with Jatropha oil. This vegetable oil is harvested on the Ecuadorian mainland in Manabí from mature seeds of the *Jatropha curcas* plant. Being a biofuel, it is an integral part of the "Zero Fossil Fuels in Galapagos" initiative.

The German development bank KfW is financing most of the construction of the future-oriented plant with a grant.

Multi-tier Operation

The power plant has five generators with a total output of 1,625 kW. These complement a 950 kWp photovoltaic system and a 660 kW / 333 kWh Li-ion energy storage unit. This set-up allows to stop the generators completely when the sun is shining in order to reduce the fuel consumption of the plant. Diesel is only used as reserve fuel. With this design, the island is able to save an average of 155,000 litres of diesel and 410 tonnes of carbon emissions per month.



The Galapagos Islands are home to many rare wildlife species. The hybrid power plant improves Isabela's carbon footprint.

Handover in Time

As Owner's Engineer, experienced experts from Tractebel will accompany the project until 2020.

So far the team has completed extensive work: The thermal part successfully passed its performance test in autumn 2018 and the overall power plant received the provisional acceptance certificate in October 2018. Since then, the 24-month warranty has been in effect.

Parallel to the acceptance process, Tractebel organised the training course for the staff of the local utility Elecgalapagos (EEPG). As a result, they were able to assume responsibility for plant operation as early as October 2018. Today, the employees are fully familiar with the system, which works smoothly without any major issues.



Author: Samuel Karres

An interesting video introduces the innovative hybrid power plant surrounded by the unique nature that it helps to protect. The project managers describe how Tractebel has solved some highly demanding tasks:
<https://www.youtube.com/watch?v=xJfwpcbSevI>



Awarded Case Study shows Benefit of Wind Energy in Hybrid Systems



Authors: François Botreau and Dr. Patric Kleineidam

MAURITANIA, CHAD, SOMALIA, MOZAMBIQUE, NAMIBIA

For mini-grid based rural electrification projects, hybrid systems composed of diesel gensets, photovoltaics and batteries are the most common configuration. This case study, conducted on five sites in Africa, aims to assess the added value and potential of integrating small wind turbines (units of around 100 kW) into such hybrid systems.

The study is based on five selected sites. These are representative of the broad range of annual average Wind Speed (WS) found on the African continent (4.9 to 8.3 m/s) and having similar and rather high global solar irradiations of ~6 kWh/m² per day (Fig. 1).

Scientific Methodology

The simulations were for all sites based on the same typical daily load pattern. This load profile has been defined to be representative of an exemplary medium-size village of 1,200 households in rural area. The electrical demand is mainly driven by domestic use and includes a 500 kW peak in the evening.

To analyse the effects of integrating wind turbines in hybrid systems, three different technical scenarios have been considered.

- The first scenario (Scenario 1) is the diesel only scenario and constitutes the base case.
- The second scenario (Scenario 2) is the most common hybrid system configuration with PV, diesel generators and battery.
- The third scenario (Scenario 3) consists of photovoltaic, wind turbines, diesel generator and batteries.

Using the HOMER Pro software the experts of Tractebel for each scenario carried out a one year hourly resolution simulation.

On the basis of these simulation results, the team defined the optimal design and ideal size. It considered equipment, scenario and site separately to calculate the lowest Levelized Cost of Electricity (LCOE).

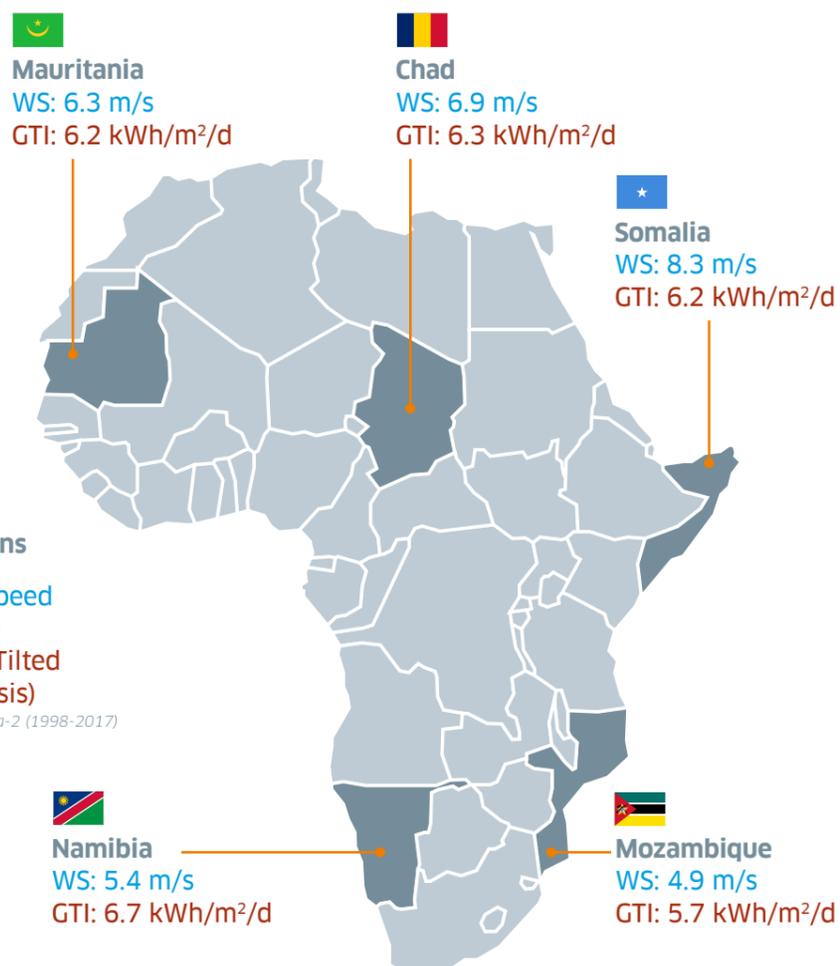


Figure 1: Site conditions

WS = Average Wind Speed at 50 m (annual basis)
 GTI = Average Global Tilted Irradiation (annual basis)
 Sources: SolarGIS (1994-2015), Merra-2 (1998-2017)

Considerable Savings possible

The study shows, that Scenario 2 enables a decrease in LCOE of more than 30 % compared to the diesel only scenario (Fig. 2). As expected, this is similar for all sites since the solar resource does not vary significantly.

Scenario 3, which considers adding wind turbines into the common hybrid configuration, enables a further decrease in LCOE from an annual average wind speed of 6 m/s and above. Indeed, for the Mauritania site (6.3 m/s), LCOE is

already 9 % lower than Scenario 2. This trend increases at higher wind speeds: for the Somalia site (8.3 m/s), a further LCOE reduction of up to 27 % could therefore be achieved.

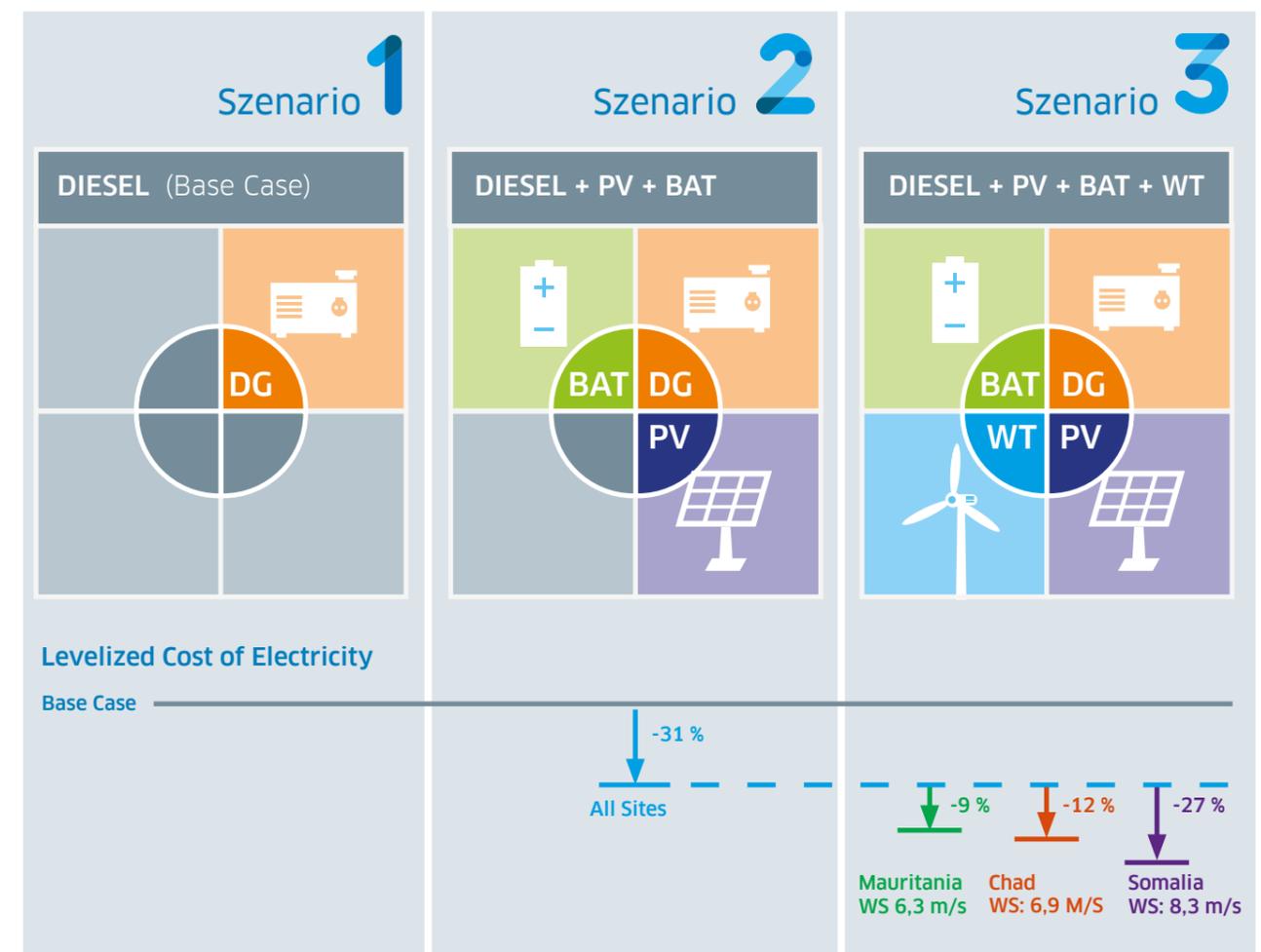
Great Potential through Wind Energy

The simulation results have shown considerable savings potential. Under the case study conditions - i.e. solar resources, fuel price and load pattern - wind turbines as part of the hybrid configuration (Scenario 3) at an average annual wind speed of at least 6 m/s allow a significant further reduction in LCOE.

It shall be kept in mind that these results cannot be generalized, but must be determined by the conditions prevailing at the time. Rather, the study shows a trend and raises awareness of the potential of integration of wind energy into hybrid systems for rural electrification applications.

Tractebel Award
 This work received the Tractebel Award 2019 for Innovation, which is an internal company competition.

Figure 2: Simulation results



Kinyerezi II: First Combined Cycle Power Plant uses domestic Resources

TANZANIA

Facing an acute power shortage in 2013 and anticipating increased power demand, the Tanzanian energy supplier TANESCO has built a 240 MW combined cycle gas turbine power plant in Dar es Salaam. The project is the first of its kind in the East Africa region and represents a technology milestone for Tanzania. Tractebel provided the consulting services for the implementation of the project.

This innovative power plant is located in the Kinyerezi district of Dar es Salaam, from which its name is also derived. Natural gas from domestic resources is the only fuel used.

Efficient Technology

The complex has a two-block combined cycle power plant (CCPP) in a 2 x 3-on-1 configuration comprising six H-25 heavy-duty gas turbines, six unfired heat recovery steam generators and two single-flow condensing steam turbines.

The power is currently evacuated through the existing 220 kV Kinyerezi substation. In its ultimate stage the plant is to be connected to a 400 kV system which is currently in the planning stage.

Now in successful Operation

Almost three years after the start of construction the Kinyerezi Phase-II project commercial operation started in March 2019. The 24 months defect liability period started at the same time.

Tractebel provided TANESCO with support on project realisation in terms of design review, site execution and factory inspections. During the construction period, up to three experts were deployed on site to supervise the construction and commissioning work. This presence strengthened the relationship with the client who appreciated the immediate technical support as well as the transfer of knowledge to its own team.

Well-contained Timeframe

The overall project objectives were successfully achieved within a well-contained timeframe. This was partly due to the fact that there were no serious accidents during construction.

Also contributing to the rapid progress of construction were the coordinated and effective efforts of the multinational stakeholders. The Japanese EPC contractor, for example, mobilised experts from Japan and India, amongst others, and built the plant with Tanzanian contractors. The experts from Tractebel will continue providing TANESCO with consulting services until the end of the defect liability period and have already started site supervision activity for another 185 MW gas turbine power plant extension to Kinyerezi I. This is located right next to the Kinyerezi II power plant.

Tractebel is therefore continuing its long-standing relationship with TANESCO and is providing it with consulting services for the expansion of Tanzanian grid capacity.



Author: Yohan Fontanier



One of the two units with three gas turbines and three heat recovery steam generators.

Modernisation: Upgrade for Load Dispatch Centre

NEPAL

The existing load dispatch centre in Kathmandu, operated by the Nepal Electricity Authority (NEA), was constructed in 2003 under the financial assistance of KfW. Its control system (SCADA/EMS) and related auxiliaries are now outdated. Tractebel is providing consulting services for the modernisation project.

The hardware components of the national load dispatch centre (LDC) in Kathmandu are obsolete and the performance and functionality of the software modules no longer meet the requirements. The Nepal Electricity Authority (NEA) also faces more and more difficulties with the procurement of spare parts. In addition, the large video display screen in the control room as well as some displays and workstations were destroyed during the heavy earthquake disaster in 2015.

A KfW-funded rehabilitation project for the replacement of the existing network control system will bring the centre up to date. The aim is to keep the SCADA/EMS functions required for the control and monitoring of the country's transmission system in operation, while the new control system is installed in parallel.

The upgrade of the main LDC will be accompanied by the establishment of an emergency/backup control centre at the Hetauda substation compound approx. 90 km outside Kathmandu.

Tractebel has been involved since the Start of the Project

The project started in 2014 and Tractebel has been involved from the very first pre-analysis through to the project implementation phase, with the project team providing all required intermediate services such as the development of the conceptual design, preparation



Author: Oliver Lanz



Point-to-point testing is used to check whether the SCADA system is working properly.

of tender documents, support in the tendering process, bid evaluation, contracting and design approval.

The installation work at the LDC started in April 2019 and meanwhile all the key components (SCADA hardware, large screen, IP telephone system and UPS) are on site and installation work is almost completed. The project is now entering its "hot phase" and the first point-to-point testing activities started on 6 June 2019. A point-to-point test is usually applied to new control systems before the site acceptance test (SAT). The main objective is to verify whether all signals, such as measurements, status information and alarms/

warnings, are processed by the SCADA system in the correct way. For this purpose, each signal as defined in the control system data model is simulated and its system-internal processing is analysed.

Tight Schedule

The point-to-point testing of the new SCADA/EMS systems in the LDC was completed in June. The official site acceptance took place in July. A successful SAT is a precondition for the new control system's test run.

The installation work for the emergency control centre at the Hetauda substation started at the end of June 2019. Site testing and commissioning of the system is scheduled for the coming autumn.

Harpo River Hydropower Project – Energy from Mountain Water

PAKISTAN

The town of Skardu and a large number of villages in the mountain region of Gilgit-Baltistan are to benefit from a new hydropower project on the Harpo River. Led by Tractebel, a joint venture with Pakistani partner National Development Consultants (NDC) is to work on the project.

Back in 2011 the German hydropower experts from Tractebel (at that time Lahmeyer International) had previously completed the feasibility study for this future-oriented project in 2011. Now they are once again working on it for the Pakistani Water and Power Development Authority (WAPDA).

In the next two years they will be preparing the tender documents and assisting with the award of the contracts for the construction. The environmental and social impact studies will also be undertaken during this period. Construction itself will take a further four years.

Sophisticated technical Solutions

The plant on the Harpo River, a tributary of the famous Indus River, utilises a head of almost 750 metres and will generate an output of 34.5 MW. The Harpo River's water will be collected by a Tyrolian-type weir. The design principle of this system will prevent coarse bed load from entering the intake waterway.

Also planned is a waterway with a double chamber desander, an open channel section and a penstock for feeding the water to the powerhouse. Two vertically arranged Pelton turbines will generate annually an electricity output of almost 170 GWh.

Access Road with Suspension Bridge

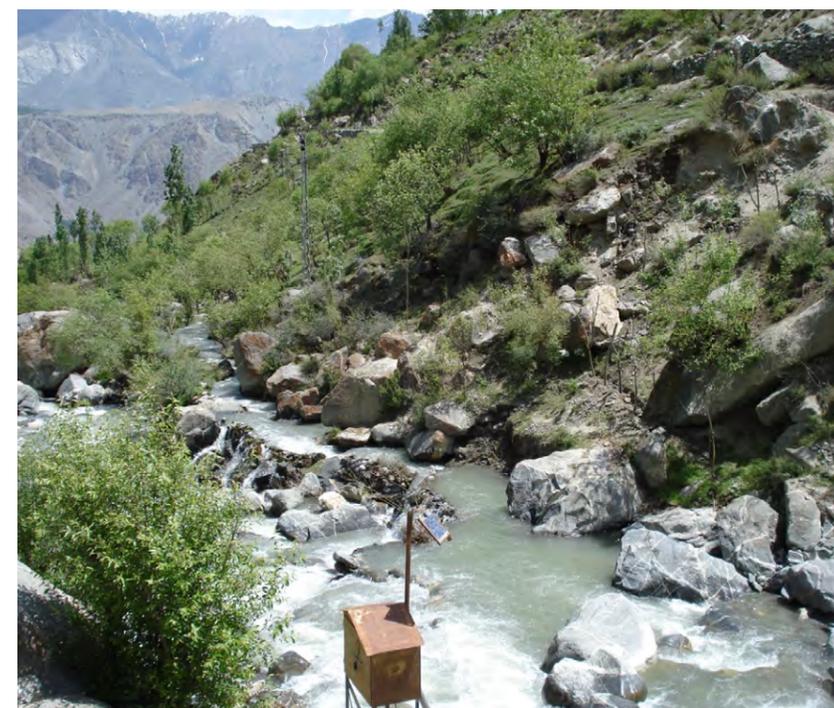
The power station project is expected to be completed in 2025. The project also involves construction of a new access road and a suspension bridge with a span of some 150 metres across the Indus.

Funding for the studies and the construction of the project is provided by a cooperative effort between two international development banks – the German development bank Kreditanstalt für Wiederaufbau (KfW) as the main funding party, and the French Agence Française de Développement (AFD). Both institutions already have many years of experience of working with WAPDA as project developer.

On 26 April 2019 WAPDA and representatives of the joint venture signed the contract with a value of around Euro 8.5 million.



Author: Christoph Grass



A new hydropower plant is to be built on the Harpo river with the know-how of Tractebel.

New Assiut Barrage and Hydropower Plant

EGYPT



Author: Egon Failer

The New Assiut Barrage and Hydropower Plant was inaugurated in mid-August 2018 after a design and construction period of some 10 years. Since the commissioning of the old weir in 1902, this facility has played a key role in Egypt's food self-sufficiency. Today the storage provided by the barrage supplies up to 440 m³/s of water to irrigate about 690,000 hectares of agricultural land along the banks of the Nile. This secures the agricultural livelihood of about 16 million people.

Involved for more than 10 Years

Studies to assess the structural condition of the Assiut Barrage were undertaken already in the 1980s. In early 2008, the Reservoir and Grand Barrages Sector (RGS) of the Ministry of Water Resources and Irrigation awarded an engineering contract to a JV led by Tractebel (Lahmeyer International at the time). This contract covered the development of the tender design for a new barrage, preparation of tender documents, management of the social and environmental impacts and management and supervision of the project construction.

Challenges due to complex Foundation Soil

In the course of the subsoil investigations 20 test drillings were drilled. All reinforced concrete structures in the river bed are founded on sand and gravel deposits with varying permeabilities of between 1x10⁻⁴ and 2x10⁻⁵ m/s. These foundation conditions made the design and construction of the 28 m deep construction pit, with an area of 175,000 m² and formed by a cofferdam and a temporary "hanging" diaphragm cut-off wall, a demanding engineering task.

A major Challenge – the Construction Pit in the River Nile

The new Assiut Barrage was constructed directly in the River Nile, since a diversion of the river was not feasible. The appropriate and safe design and execution of the construction pit in the river was crucial for successful project implementation.



Technical details and the key features and challenges associated with the implementation of the project were presented by Resident Engineer Dr. Ute Schran in a seminar to colleagues at Tractebel in Bad Vilbel.

After excavation of the construction pit and installation of 81 deep wells almost 300,000 m³/day of seepage water had to be pumped out each day during high river water levels to keep the construction pit dry. During the dewatering period from May 2013 to June 2016, the more than 210 million m³ of seepage water which was discharged was close to the optimised value which had been previously calculated.

Navigation Locks for Cruise Ships

The two gated outlets have sufficient capacity to discharge the defined "emergency release flood" of 7,000 m³/s. A reinforced concrete navigation lock, with two parallel and identical chambers, enables modern cruise ships and bulk carrier barges to navigate faster between Cairo and Aswan.

Energy Generation in a modern Powerhouse

In the newly built powerhouse in the riverbed four bulb turbine generating units of 8 MW capacity each are installed. They generate annually 230 GWh of clean power. This is equivalent to a reduction in CO₂ emissions of 125,000 tons per year.

On 13 August 2018 the new Assiut Barrage was officially opened by the President of the Arab Republic of Egypt, Abd al-Fattah as-Sisi.



View of the construction pit prior to dewatering in December 2012



View of the construction pit after dewatering in December 2013 (Photos: Dr. Ute Schran)

Upper Atbara Dam Complex - Increased Utility due to optimised Planning



Author: Dr. Frank Zöllner

SUDAN

The four sets of generators of the "Dam Complex of Upper Atbara" hydropower plant have been in regular operation for about a year now. Tractebel provided the customer with support in this endeavour with extensive design modifications, during the tender process, as well as with the project management and construction supervision.

The majority of the water volume passing through Sudan comes from the summer rainy period in the Ethiopian highlands. This water flows between July and September to the north in the direction of the Nile. The low amount of precipitation on location also falls almost exclusively during that time of the year.

Given the seasonal risk of flooding, Sudan therefore lacks the water resources needed for agriculture during the remaining months. Traditional rainwater reservoirs and wells can at best only mitigate the water shortage.

The first modern dams connected to hydropower plants were built at the beginning of the 20th century. Further facilities were built in the 1960s, like the Kashm El Girba Dam at the Atbara in eastern Sudan, situated 80 km downstream from the confluence of the Upper Atbara and Setit.

Urgent Demand

The idea of constructing another dam located upstream of those two rivers has existed for some time. Since the Kashm El Girba Reservoir has become increasingly silted up after many years of operation, a solution was urgently needed.

A new dam complex will now bring relief. It ensures the yearly irrigation of a 300,000 ha area and contributes a sizable part of the electrical energy supply.

Adjusted Planning

Tractebel took on the design validation and corresponding optimisation studies for the project in 2010. This resulted in an updated irrigation concept with extensive changes to the previous design. The Tractebel experts assisted the customer during the tender process and took on the project management and construction supervision on-site.

Execution within eight Years

The solution proposed by Tractebel has now become reality: An integrated 320 MW hydropower plant is part of the 13 km long "Dam Complex of Upper Atbara" unit. The reservoir, which has a volume of 3.7 billion m³, also provides effective flood protection. In parallel, as part of the "Gedaref Water Supply Project", it supplies 450,000 people with fresh water via a 70 km pipeline.

The first of four sets of 80 MW Kaplan turbine generators was synchronised in the completed powerhouse in January 2018. The last installed generator was brought online in mid-June 2018. The plant has been in regular operation since then.

After eight years of planning and execution, and one year of regular operation, the Tractebel engineers can look back on a completed mega-project worth more than one billion Euros and with major national significance.

Upper Atbara hydropower plant: Works water intake with pressurised piping, powerhouse and GIS



Second Site for the Bumbuna Hydropower Plant in Yiben



Author: Dr. Jens Mödinger

SIERRA LEONE

The existing Bumbuna hydropower plant on the Seli River in the heart of Sierra Leone accounts for around sixty percent of the country's electricity generation. There is to be an expansion of plant capacity using Tractebel's know-how, and the new Yiben power plant featuring a dam is currently in the planning stage. Tractebel has been supporting the Owner in the implementation of the project since the planning phase.



Around three million inhabitants of Sierra Leone will benefit from the expansion

Bumbuna is the third largest privately developed hydropower project in Africa and the aim of the planned expansion is to improve electricity supply.

Bumbuna Expansion

The scheme comprises a by-pass from the existing reservoir of the Bumbuna dam to a powerhouse with two 42 MW Francis turbines in a small tributary valley. Up to 82 m³/s of water will flow through a 1.9 km concrete-lined headrace tunnel and a 0.5 km steel-lined penstock.

The 1.7 km by-pass channel conveys the water back to the Seli River just downstream of Bumbuna waterfall. This increases the head by 40 m – about 50 % more than in the existing power plant. A smaller turbine with almost 4 MW near the tailrace of the existing plant provides the required minimum channel flow.

New Yiben Hydropower Plant

The dam of the new Yiben site is some 32 km distant in the area of

the end of the Bumbuna reservoir. In the original plans from the 1970s a different site was envisaged but this was subsequently revised to take account of significant impacts on existing settlements and infrastructure. The structure is now to be built at an alternative site in the immediate vicinity, but upstream of the site previously planned.

Different Alternatives

Tractebel suggested a Roller-Compacted Concrete (RCC) dam, the idea being that this would enable a short construction time and partial filling during the construction period. The foundation conditions determined in the course of the exploratory work certainly indicated that this would be appropriate.

During the tendering process and negotiations with the preferred bidder, however, the tender offer led to a switch in preference to a Concrete-Faced Rockfill Dam (CFRD).

The dam to be built will have a height of 86 m and a crest with a length of

almost 740 m. The active storage capacity will be around 1.3 km³, which equates to almost 70 % of the average annual inflow. Two Francis turbines with output of 27 MW each are to be installed in the powerhouse at the foot of the dam.

The Bumbuna hydropower complex will have four powerhouses in total, providing total installed output of 190 MW. It is estimated that average annual energy generation will be 1060 GWh/a, with more than 90 % accounted for by the new sections of the plant.

Consulting Services since Project Development

Tractebel Engineering has been involved in the project since the development stage. Its hydropower experts have provided their client, Joule Afrika, with technical support on every phase of development and they will be providing consulting services for the implementation of the project as the client's representative up to the acceptance stage.

Flood Control Reservoir stops Flooding of the Wipper

GERMANY



Author: Lars Schaarschmidt

A new flood control reservoir is to provide protection against flooding for more than twenty settlements on the Wipper River. The ecologically designed structure can hold back 4.25 million m³ of water. Tractebel has been the general engineering services contractor for this challenging dam project since 2013 and is supervising its construction.

Many settlements along the Wipper suffer from flooding. Damages in recent years amount to tens of millions. A new flood control reservoir which is passable for fish and other wildlife will provide relief.

The project is one of the components of the flood protection strategy for the Wipper, which covers a catchment area of 621 km² as far as the mouth of the Saale upriver of Bernburg.

On the upper course of the Wipper, immediately upriver of the village of Wippa in the district of Mansfeld-Südharz, the controlled flood control reservoir is being constructed with an ecologically designed culvert.

Talsperrenbetrieb Sachsen-Anhalt appointed Tractebel for the general engineering services for the construction of the new Wippa

flood control reservoir in 2013, from execution planning onwards.

Planning

The hydraulic engineering experts from Tractebel optimised the existing draft plans and prepared the execution plans and tender documents for four lots. Model trials at the Nuremberg Institute of Technology confirmed that the solution recommended for the complex culvert work in hydraulic terms.

Start of Construction in 2014

The main works started in June 2014 and will take until the end of 2019. The ceremonial start of construction, including the laying of the foundation stone, was attended by the Environment Minister of Saxony-Anhalt at the time, Hermann Onko Aeikens, along with other representatives from the world of politics, administration, planning and construction on 23 September 2014.

Preceding the start of construction were a range of preparatory measures, including a new replacement for the Wipper Bridge, the demolition of the old Wippa water-works, tree felling work, tree planting and other species conservation measures.

Spillway

The new barricade structure is comprised of a dam with a culvert in which the service outlets and the spillway are integrated. The top of the dam is 17 m above the valley floor and is 190 m in length, the bottom of the dam being 120 m in width.

8,000 m³ of concrete and reinforced concrete along with 1,600 t of reinforcing steel were used for the construction work. The rockfill dam with an inclined seal is comprised of 150,000 m³ of bulk material.

Extraction of Materials

The material for the supporting structure is from a newly opened quarry nearby in the valley of the Wipper. Tractebel prepared the structural safety calculations and planned the stabilisation of the rockwalls. The expert team was also responsible for the geotechnical construction management including the metrological monitoring.

With the hand-over of the program for the test filling of the reservoir and the provisional specifications for operation, everything is set for the reservoir to be put into operation as planned in 2020.

Aerial view: Dam with culvert



Hydropower Plant Feke-II supplies Electricity to over 50,000 Households

TURKEY



Author: Seda Korkmaz

Feke-II Hydropower project in Adana, Turkey, with 114 million dollar investment value, fights against the increasing energy demand by supplying electricity to over 50,000 households. After 32 months of construction initiated in 2007, the plant was commissioned in 2010 and saves a considerable amount of CO₂.

Hydro Dizayn, a company of Tractebel, is responsible for the feasibility study followed by final and detailed design of the Feke-II HEPP project. Tendered as a BOT project, since 2007 the electric utilities company Akenerji holds a concession for 49 years.

High Storage Capacity

The 70 m high roller compacted concrete (RCC) dam provides a total storage capacity of 63 million m³ and creates a gross head of approximately 63 m. A discharge of 127.5 m³/s is conveyed to the power plant via two 110 m long penstocks, which are located at the toe of the dam's body. Both penstocks have an inner diameter of 4 m.

Feke-II power plant, is equipped with two Francis turbines, each with a rated capacity of 35.7 MW. It has a total installed capacity of 71.4 MW and can generate up to 223.4 GWh of electricity per year. The scheme was commissioned in 2010 and has been generating an average of 182 GWh per year ever since, which ranks it as the 79th largest HEPP in Turkey.

Advantages by Location

The project area is located on a meandering section of Göksu River which makes the site convenient for the construction progress with advantages such as separate diversion works, and faster RCC dam erection.

The project's spillway with three radial gates (11.0 x 12.50 m) has a discharge capacity of 2,700 m³/s. It is located on the right abutment. This enables a better arrangement of the powerhouse and the switchgear at the toe of the dam. Therefore the length of the spillway's chute is shorter, which reduces construction costs.

Aside from the energy supply, with the generation capacity of Feke-II HEPP, 122,205 tons of carbon dioxide emissions can be saved annually.

Feke-II Hydropower Project and Dam near Adana



Malthouse uses Water Recycling to reduce Carbon Footprint

GERMANY

An innovative plant for process water treatment leads to significant improvement in the water and carbon footprint of a malthouse. It enables savings of around 120,000 m³ of fresh water and wastewater each year. At the request of the customer the project was carried out by GWK Consult as EPC contractor as a turn-key scheme.

The production of malt requires large amounts of water. This means that a correspondingly large amount of organically polluted wastewater is generated: Europe's malthouses consume 44 million m³ of fresh water each year, disposing of 30 million m³ of wastewater at the same time.

Process Water Treatment

However, this type of process water can also be treated. This can be achieved using a method which combines biological treatment with a membrane filtration process. The resultant water quality meets the highest standards. This means that the used water can be reused, for example for steeping barley.

Existing technical Equipment integrated

GWK Consult planned and implemented a plant for Cerealien Bischheim GmbH which works according to the principle of the membrane bio-reactor method. The task of the experienced environmental engineers also involved integrating the new process in the existing plant as far as possible while using the existing technical equipment.

In addition to the solutions for the recycling of the process water, GWK also developed a sustainable recycling strategy for the surplus biomass. Only 12 months were left for installation and commissioning.



A new ultrafiltration plant for process water treatment reduces the water consumption and the malthouse waste water



The process water tank has a capacity of 750 m³



Authors: Dr. Thomas Jäger, Benjamin Klausing

On the basis of an EPC contract, GWK undertook the detailed design, procurement and turn-key execution of the construction and installation work.

In close cooperation with the customer the experts developed a concept which meets all requirements. Thanks to its innovative character and massive savings in terms of fresh water, wastewater, waste and carbon dioxide, the project also stands an excellent chance of receiving subsidies.

Customer Benefits

The new plant for process water treatment enables the malt producer to achieve a drastic reduction in its water and carbon footprint. The reduction in fresh water and wastewater amounts to 120,000 m³ each year.

Moreover, the plant also saves more than 170,000 kg of CO₂ equivalent each year. Surplus biomass from the biological treatment stage is disposed of and used as a valuable substrate in a nearby biogas plant. The biogas produced is used as fuel in an efficient combined heat and power station.

The fermentation residues from the biogas plant are used as fertiliser for the regional barley growing areas. Hence, the nutrient cycle is closed.

GWK Consult has developed an innovative concept with this ambitious project, one which sets an example for the closed circle economy. It is coherent and offers nearly complete recycling.

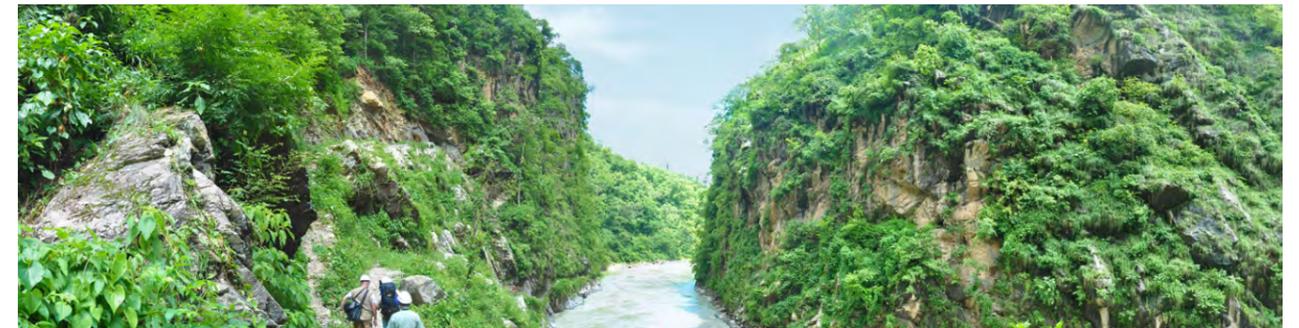
Tanahu Hydropower Plant: Consultant continues its strong Presence in Nepal

NEPAL



Autor: Bernhard Stabel

Construction work on the first major storage type hydropower project in Nepal has started west of Kathmandu in the district of Tanahu. It will substantially increase the firm capacity of the national grid and thus stabilise electricity supplies. Tractebel is the Project Supervision Consultant (PSC).



Tanahu dam site, Seti river looking downstream

The hydrological and topographical conditions in Nepal mean that through the development of hydropower, the country may play a crucial role in supplying the Indian subcontinent with electricity.

The Tanahu Hydropower Plant on the Seti River - about 150 km west of the capital Kathmandu - will be one of the country's major storage type hydropower projects after Kulekhani HEP, and therefore fulfils an important role for the future implementation of similar plants. The owner is Tanahu Hydropower Limited (THL), a special project

company of the Nepal Electricity Authority (NEA).

Bridging dry Periods

Nepal suffers under energy shortage especially in winter when the rivers have very little water. The Tanahu storage project aims at storing the water during the monsoon season and drawing from the reservoir in winter to produce power during this period.

The dam will be provided with a sediment flushing system, in order to keep the reservoir free from excessive sediment deposition and maintain a live storage. There will be an underground cavern with two turbines of 70 MW each. The main dam is designed as a 140 m high concrete gravity dam.

International Funding

Tractebel provides the engineering services in association with Manitoba Hydro International from Canada. The work is financed by the Asian Development Bank (ADB), the European Investment Bank (EIB) and the Japan International Cooperation Agency (JICA).



Access road to the underground works

Experienced Team

The owner has a reliable partner in Tractebel as the PSC for the project during tendering, construction supervision and the first five years of operation.

This concept has already been proven successful during the implementation of the lower Marsyangdi hydropower plant in Nepal (1978 to 1997) when Tractebel (Lahmeyer at the time) provided all engineering services from feasibility studies to assistance in operation over several years.



PSC/THL team with Managing Director Mr. Thike (front row, centre)

Water Resources Management in the Pyanj River Basin



Author: Dr. Kristin Quednow

TAJIKISTAN

The Ministry of Energy and Water Resources of Tajikistan is currently reforming the water sector in its country and Tractebel is providing consulting services for the planned measures in the Pyanj River Basin, with a River Basin Organisation and data infrastructure to be established. The project will therefore improve the institutional capacities of the water resources management system in Tajikistan.



View of the Yaksu River in the Pyanj River Basin

The Pyanj River is a tributary of the Amu Darya and over much of its length forms the border between Tajikistan and Afghanistan. Covering an area of 114,500 km², it is the largest of the country's five river basins. With a population of approximately 1.27 million, the Pyanj River Basin also contains a large portion of the country's agricultural land and plays a vital role in Tajikistan's food security. Climate change, deteriorating water infrastructure and inadequate operation and maintenance capacity of WRM institutions however pose significant challenges throughout the country.

High Priority

Recognising these emerging risks, the Government of Tajikistan modified its Water Sector Reform Programme and has prioritised efforts to improve capacity to manage water resources, boost food production and climate

change adaptation capabilities. The project is being funded by the Asian Development Bank.

Objectives and Services

Tractebel is supporting the Ministry of Energy and Water Resources of Tajikistan in (i) achieving the goals of the water sector reform in Tajikistan; and (ii) the formation of the Joint Commission for the Pyanj River Basin (JCPRB), River Basin Organisation



Training of RBO members in Kulob

(RBO) and River Basin Council (RBC). Together these bodies manage the resources of the Pyanj River Basin. This work is based on the principles of integrated water resources management (IWRM).

One of Tractebel's assignments is the preparation of an integrated River Basin Management Plan for the river basin to develop and monitor water uses; based on an information management database and processing system.

Achievements and ongoing Activities

Since the start of the project in 2017, significant progress has been made by establishing RBOs in two districts of the river basin and equipping them with modern offices and appropriate water management tools. Tractebel's experts developed a capacity building plan and continue to provide regular training to the RBOs in IWRM including employment of GIS and database technology.

The creation of a functional database with reliable data on the existing water infrastructure in the basin is an important prerequisite for the effective work of the RBOs. In order to achieve this, Tractebel is currently carrying out a consolidated inventory of all surface and groundwater intake points and water-return points, along with wells. The information will be mapped using GIS and recorded in a spatial database.

Rehabilitation and Modernisation of the Nalubaale & Kiira Hydroelectric Power Plants

UGANDA

Uganda's least expensive and most important source of electricity is hydropower. To address power demand growth, the development of new hydropower plants and the modernisation of existing ones on the White Nile is necessary. Tractebel is carrying out a feasibility study for the rehabilitation and optimisation of two hydropower plants at the outflow of Lake Victoria.

The Nalubaale (180 MW) and Kiira (200 MW) hydropower plants are located near the town of Jinja right on the outflow of Lake Victoria, some 85 km east of Uganda's capital Kampala. The two run-of-river plants, constructed in the 1950s and 1990s, are operated in parallel at the head of the White Nile.

Uganda's Demand for Energy is growing

Over the past years, Uganda has repeatedly suffered power shortages caused by various reasons including periods of drought and growth in energy demand. To address this, new hydropower plants have already been put into operation or are under construction along the river. In addition, Uganda Electricity Generation Company Limited intends to modernise the existing Nalubaale and Kiira hydropower plants to keep them operating for the next 30 years.



Downstream view of the Nalubaale dam

Consulting Services from Tractebel

The KfW-funded study on the assessment of the technical and economic feasibility of the required measures is split into two phases. In a first phase Tractebel is assessing the condition of the plants and using this as the basis for identifying possible options for their rehabilitation and optimisation. In the second phase of the project up to three alternatives will be examined in more detail. The objective is to develop a full bankable feasibility study for the preferred options.

162 possible Options

The various options, their advantages and disadvantages and possible social and environmental impacts were identified by Tractebel's engineers together with all stakeholders in workshops. This resulted in a total of 162 options derived from the possible combinations for rehabilitation and the replacement of some, or all of the 15 machine units and associated electrical equipment. The hydropower experts also included various levels of rehabilitation of the structural fabric of the Nalubaale powerhouse in their considerations too, as well as complete replacement with a new structure.

Given the impracticality of examining every option in the required detail, the Tractebel team devised a decision matrix and cut down the options by applying qualitative criteria on a systematic basis. This left ten cases for quantitative analysis which considers technical, ecological and social issues along with underlying economic conditions and the local energy market characteristics.

Phase 1 is expected to be completed in the third quarter of 2019, to be followed by the start of phase 2 of the project.



The Kiira power plant with five propeller-type units



Author: Christian Meyer

Return of Berlin's Stadtschloss to former Glory

GERMANY



Autor: Stefan Wurl

The arts and sciences will be given a new home at the historic Schloßplatz in Berlin Mitte. The former Berlin Stadtschloss, or City Palace, is being reconstructed as the "Humboldt Forum", featuring the old facade and a new use scheme, with completion in 2020. Lahmeyer Deutschland is providing consulting services for this ambitious project which also includes the historic reconstruction of a section of streets.

The new building is located directly above the tunnel of subway line 5. In terms of elevations it is similar to the previous Baroque facade of the old Stadtschloss. However, the underground transport route and the reconstruction work are by no means the only challenges being mastered by the construction team with the assistance of Lahmeyer Deutschland. This is because the building is located on an island with exceedingly boggy soil which had to be compacted and consolidated before the start of construction.

Eventful History

The beginnings of the Stadtschloss date back as far as 1443. Elector Friedrich III (King Friedrich I in Prussia as from 1701) later developed it into a magnificent royal residence. After 1699 it was used as a secular building. In the Second World War the Schloss was completely burnt down, with the exception of the north-west wing, in a bombing raid. The remaining sections

were blown up under the direction of the GDR. Built in its place was the "Palace of the Republic", which in turn was demolished between 2006 and 2008.

Reconstruction of the former Berlin Stadtschloss as the "Humboldt Forum" on the historic Schlossplatz was started in 2012. This includes the partial historic reconstruction of the section of streets covering Werderscher Markt – Schleusenbrücke – Rathausbrücke – Rathausstraße. The "Museumsinsel-Ost" subway station is also included in the development scheme which is known as "Hauptstadt Berlin – Parlaments- und Regierungsviertel".



Civil engineering work in front of Portal V opposite the Lustgarten



The Baroque facade of the new Berlin Schloss, with the former GDR State Council Building in the background

Lahmeyer Deutschland involved from the very Start

Appointed by DSK Deutsche Stadt- und Grundstücksentwicklungsgesellschaft mbH, Lahmeyer Deutschland is providing consulting services for the scheme. Its infrastructure experts have been involved ever since the initial land clearance back in 2006. They have been responsible for the overall coordination and overall project scheduling for the technical infrastructure, the preparation of the transport concepts for the period of construction and the preparation of the spatial organisation plans (documentation of existing cables and pipes and coordination of the cable/pipe plans).

Thanks to walkways and green spaces, the citizens of Berlin were still able to use certain sections right up to the start of construction of the "Humboldt Forum". A temporary art gallery was even erected as well. An information centre for the duration of construction, the "Humboldt Box", was also erected on Karl-Liebknecht-Straße.

On 12 June 2015 the "Humboldt Forum" celebrated its topping-out ceremony and the planned opening is in 2020. Completion is therefore now in the home straight. At present, extensive work of installing pipes and cables and pavement work is underway.

Together with the museums on the Museum Island, Humboldt University, the German Historical Museum and the National Library, the "Humboldt Forum" will become a unique location of world culture and science.

Alterations at Frankfurt Airport: New Routes for Baggage

GERMANY



Author: Anna Serfas

Almost 70 million passengers take off and land at Germany's biggest airport, Frankfurt, each year. Last year the baggage conveyor system with a total length of 81 kilometres transported no less than 28.9 million items of baggage. This is increasing all the time and to keep pace with this growth the system is continually being extended. Lahmeyer Deutschland is managing construction measures for the next stage of extension.

The airport operator, Fraport, is constantly upgrading the existing baggage conveyor system to account for growing passenger volumes and changing requirements. The next stage of extension is a multi-layer baggage checking system (MBCS). In addition to the actual baggage conveyor system itself, the prerequisites in terms of structural and building services requirements need to be met for installation as well. Experts from Lahmeyer Deutschland are providing consulting services for these in various fields. These include, for example, fire protection measures, modifications to the building service equipment, and alterations to load-bearing structures of the buildings concerned.

Underground Construction

The current extension project covers a new connecting section for the baggage conveyor system in the area of boarding gate A-Plus. The layout of the existing terminal means that a complex solution is required. This is because an underground connecting structure is required as an extension between the existing Terminal 1 building and boarding gate A-Plus.

Work carried out while normal Operations continue

Approximately 14 metres of soil beneath the existing building is to be stabilised and removed in sections in accordance with underground excavation practice while operations continue. When the



Baggage conveyor system at Frankfurt am Main Airport (Photo: Fraport AG)

temporary outer shell and the required vertical shoring have been completed, the floor slab for the new connecting area is to be constructed. A vertical surrounding wall is to provide the space enclosure. Following this, the newly created area is to be connected to the existing adjacent section of the building.

Since there is no access from above, the construction team will only be able to carry out the work from the basement level. The aim is to keep construction work in the restricted parts of the airport to a minimum to avoid or minimise as far as possible any disruption to operations in the terminal and its ancillary areas.

Once the connecting area in the basement has been completed, the building service equipment is to be installed. Then nothing else will stand in the way of installing the baggage conveyor system.

Many Years of Experience

Lahmeyer Deutschland is handling the management of the construction project, for which it has many years of experience to contribute. The company has successful operations in both building construction and tunnelling. Based on this know-how the customer will receive an optimum solution for this challenging project, despite the difficult technical circumstances.

We are Tractebel

WORLDWIDE

Tractebel provides a full range of engineering and advisory services throughout the life cycle of its clients' projects, including design and project management. As one of the world's leading engineering and advisory companies and with more than 150 years of experience, it's our mission to actively shape the world of tomorrow. With about 5,000 experts and presence in more than 70 countries, we are able to offer our customers multidisciplinary solutions in energy, water and urban.

Since December 2014, Tractebel Engineering GmbH (former Lahmeyer International) belongs to Tractebel and thus is part of the international ENGIE group headquartered in Paris. Tractebel (Brussels, Belgium) and Tractebel Engineering GmbH (Bad Vilbel near Frankfurt, Germany) cooperate on numerous international projects as one company.

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