

ALPHA

THINK QUALITY

03/2023



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TO DO IT RIGHT?

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EDITORIAL

RETHINK THE SYSTEM - PLANT ENGINEERING AND OPERATION IN A SUSTAINABLE FUTURE IN THE FACE OF FIERCE INTERNATIONAL COMPETITION

Our customer magazine is already in its third year of publication. The focus has always been on a current topic from ALPHA's broad portfolio, in the last issue the cyber security of machines and plants in critical infrastructure. In discussions with our international customers since then, we have noticed an increasing focus on the sustainable design of international plant construction projects and, above all, the operation of plants. In our first issue in 2021, this very approach of a holistic view was already the subject of a detailed article by Julia Krause.

In the meantime, everything has become more complex. Keywords such as "sustainable financing", power-to-X, hydrogen as an energy carrier, green steel, carbon capture or digitalization of production plants have moved more into the focus of technical discussions. Added to this are questions of extended functional safety, taxonomy or even the classification of equipment in international plant construction projects.

ALPHA has also increasingly invested in consulting projects in these areas and has gradually developed as one of the leading global firms in these areas. Our holistic approach, together with our high in-house compliance rules, leads to a steady expansion of our portfolio and client base. A holistic approach has always been a great strength of our business. It is not enough to look at singular processes and solve them individually at best. This is one of the central questions for a more sustainable future. That is why ALPHA fundamentally questions the status quo in order to actively

drive change. Because tomorrow's climate goals cannot be achieved with yesterday's technologies. To combine digital growth with investments in sustainability, ALPHA supports our customers worldwide in their sustainable transformation.

The topics in this issue relate precisely to this: Udo Fricke explains methods and his practical concept of financing the construction of a plant with all the practical possibilities for sustainable investment, Julia Krause presents in detail the exciting concept of the iceberg model in technical regulation in her high-quality article and argues that technical regulation is the basis for compliance. A third editorial deals with the construction and operation of facilities for the production of green steel, not without leaving out problems of taxonomy and technical feasibility.

Another article of the main theme of this magazine examines how to save costs in the construction of plants - which after all represent between 05 and 09% of the total volume - but without skimping on quality and safety.

Other interesting articles introduce the increasingly important plant construction market of Kazakhstan and show our readers brand-new innovations in the field of certification of industrial products for export to China. In the last three years, ALPHA's portfolio has changed a lot: Important target markets such as China, South Korea, Central Asia, the Gulf States or even the European Union have grown strongly, ALPHA services such as project financing and development, technical consulting in the

normative system of green technology or hydrogen, certification and commissioning of complete plants have been further expanded.

Our own developed ALPHA digitalization products ERDA (a hosted global certification tool for manufacturers, plant builders and plant operators based on AI features) and a soon to be launched cybersecurity system for critical infrastructure offers our international customers further transparent solutions in the fierce competition.

You can always be sure of one: At ALPHA, we drive your business success by supporting the sustainable, compliant, and digital transformation of your industrial plant construction and operation business globally - from consulting and strategy to auditing, certification, expediting, digitization, and operation and protection of your innovative technologies and plant construction projects. With our industry expertise, we help you to make decisions in terms of climate neutrality and the environment, and to combine measures with progress, plant safety and business success in the development, construction and operation of plants.

Dr. Thomas Krause (CEO) wishes you new insights and a lot of fun reading.



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FINANCING

A BIG WORD, BUT HOW TO DO IT RIGHT?

Currently, there is a lot of talk about financing as the key to sustaining projects. We have taken this as an opportunity to provide you with some important information and assistance on this subject. Pure financing should be preceded by a number of considerations in order to be successful in the end. This can perhaps be better summed up by the term “project development”, because financing is a very important part of project development.

By project development we mean the entire process in a manufacturing company, from the idea to the realization and commissioning of a new production site. We consider the financing itself as the part of the implementation, because without a solid financial basis such a project will fail.

Basically, there are several forms of financing. We distinguish between them:

- 1.) Financing of pure supplies (e.g. machinery, apparatus or other equipment),
- 2.) Leasing of machinery and equipment,
- 3.) ECA covered financing of supplies and services of machinery and equipment,
- 4.) Project financing of a complete investment project including design services, project management, supplies including transportation, construction and installation, commissioning and occasionally a fixed period of technical support or training of customer personnel,
- 5.) Crowdfunding, rather less known in mechanical and plant engineering, but should be mentioned for the sake of completeness.

RE 1.) FINANCING OF PURE SUPPLIES

This is certainly the most common type of financing and relatively simple. An exporter supplies a machine and provides financing to the importer. The simplest form is the granting of a payment term, e.g. 360 days. Naturally, this is only done if the importer has sufficient financial

solidity. To assess this, you can use the services of credit agencies or ask to see the importer's balance sheet directly, and reputation and (good) experience from past business contacts also play a role.

RE 2.) LEASING OF MACHINERY AND EQUIPMENT

In recent years, leasing has established itself in isolated cases as a financing instrument, especially if the leasing period (e.g. 5 years) is manageable and a return of the machine or plant (usually only smaller package units, not complete plants) is planned from the outset. In the case of leasing, the machine or plant does not become the property of the importer but remains either with the exporter or a leasing company. For the importer it has the

advantage that his balance sheet is not burdened, since he does not have to balance the machine / plant as a fixed asset. The problem with this type of financing is the determination of the residual value at the end of the leasing period and the probable technical condition of the leased asset. Both of these factors have a lasting effect on the calculation of the leasing rate.

RE 3.) ECA-COVERED FINANCING OF SUPPLIES AND SERVICES OF MACHINERY AND EQUIPMENT

Below are some indications of the different parameters that end up being incorporated into ECA covered financing, most of which are not apparent at first glance.

These are usually economic considerations, e.g. opening up a new market, but also government measures that hinder the export of your product and are to be circumvented by setting up local production. But it can also be very specific wishes of your customer, who not only wants to buy a good product, but also wants a technology transfer or partial production in the host country, further considerations, such as the proximity to important raw material sources and sales markets, cheaper means of production, shorter delivery routes, simpler customs procedures, changed currency relations, to name just a few.

In the beginning, every entrepreneur has to deal with the question, is it worth it to me at all and is the market there that it is interesting and economical for me as a company to relocate my production partially or even completely.

First of all, based on the production lots in the company, the question of the number of units from which such a location can generate a profit must be roughly clarified. This is “virtually” the minimum number of products that must be produced and sold in the target country in order not to run into the red. Once this figure has been determined, the next step is to compare it with the actual market conditions.

Market conditions are understood to be statistical figures that quantify the size of the entire market. Competing companies already active on the ground must also be taken into account. After studying these sources, one usually has a relatively good overview to come to an initial rough economic assessment of whether it is interesting to deal more closely with a localization market or not.

Now it's time for implementation, and there - as so often in life - the devil is in the details. Now is the time to set up a task force whose job it is to oversee the project from start to finish. In addition to the project manager, it is advisable to integrate a commercial project manager and to supplement this team with specialists from the departments involved (e.g. development, design, production planning, assembly, purchasing, taxes, legal or human resources). This does not have to be a 100% job, but these people should form the core team and be permanently involved or informed.

The first thing to consider is whether you want to manufacture your product 100% in the host country or whether, for example, there are parts that are particularly know-how-intensive, often called “golden parts”, and whose “secrets” are not passed on and should therefore only be supplied and installed there. Furthermore, it is important to consider whether your product should

“only” be assembled from subassemblies (as is often the case with automotive manufacturers in the first phase) or whether a real production should be set up on site. Mixed forms are of course also conceivable. This applies mainly to projects in the mechanical industry.

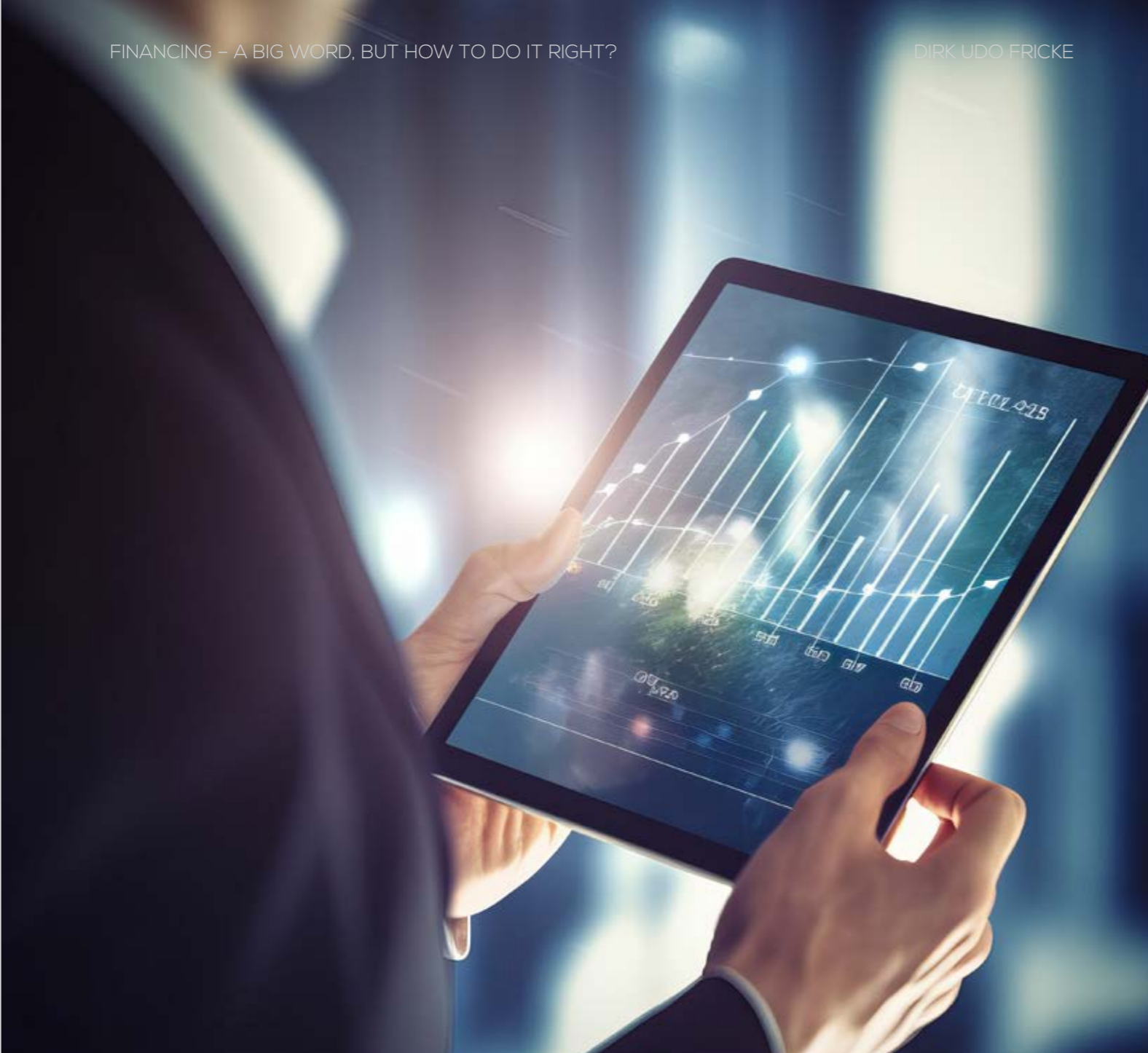
The situation is somewhat different for products of the thermal industry (e.g. pharmaceuticals, chemicals, petrochemicals or even foodstuffs). Here, there is no other way than to build a plant for the production of the respective product, in which a preliminary or final product is produced by feeding raw materials, if necessary various additives and energy in thermal processes, which can then be sold on the local market.

In both cases, it is advisable not to underestimate the “pitfalls” in terms of tax, legal, licensing and customs.

Now you “only” have to clarify whether your product can be manufactured in the host country according to the same codes and standards as in the home country. This question can be answered by local certification companies or design institutes; modifications may be necessary.

Based on the selected production capacity, it is now necessary to define the requirements for your future location. This includes things like the proximity to sources of supply of certain raw materials, media supply and disposal e.g. electricity, water, waste water, traffic routes such as roads, airports, rivers and, not to forget, to your customers. Another very important point is the wages and salaries that have to be paid for the personnel. The availability of certain qualifications and experience of your future employees may also play a role. Not to forget local differences in charges such as taxes, licensing procedures and their costs, etc. - For SMEs it can be interesting to settle in special economic zones or industrial parks, of which there are now a large number. Often, these offer comprehensive support and assistance, including the handling of all official approval processes and procedures, visa facilitation, etc. - For SMEs, it can be interesting to set up in special economic zones or industrial parks, of which there are now a large number.

Now you need to clarify whether you want to tackle the project exclusively with your own people or whether you want to rely on a general contractor. The main advantage of using a general contractor is that he assumes full responsibility for the construction of the plant in terms of schedule, quality and budget, and that he is liable to you as the client for any non-performance and provides you with guarantees. This type of contract is called EPC - LSTK (Engineering Procurement Construction - Lump Sum Turn Key) or in German “schlüsselartig”. It is mostly used for large projects, such as plants in the chemical, petrochemical, oil & gas or power plant industries.



The undisputed advantage of EPC-LSTK processing of a project is the responsibility of the general contractor to take full responsibility for the timely, budgetary and qualitatively correct processing of the order and to provide a guarantee for the fulfillment of his obligation. This is naturally offset by a supposedly higher price in direct comparison to EPC M processing. If a general contractor defaults due to influences caused by himself or does not perform his promised service, he has to pay a corresponding penalty according to the contract. The client thus receives financial compensation for his loss of production or for quality deficiencies.

This “additional price” is a kind of insurance premium paid by the customer to ensure that the project will be completed without major problems. This type of contract is therefore often found for products that have a high market value, such as oil & gas or chemical products, which are also to be produced in large quantities at the plant.

EPC M processing has now found a very broad basis in plant construction. The decisive difference is, of course, that the owner bears the full risk of his investment himself. For delays in the process, for example, he not only has to bear the additional personnel costs of the project management, but he also has to cope with the loss of production. This can quickly amount to a multiple of the supposedly “saved” amount compared to the EPC-LSTK contract. The client should also ask himself openly and honestly whether he can really assess and manage all the various interfaces that inevitably result from the individual awards. EPC M projects are mostly used for medium and smaller investment sums and very often in mechanical engineering. Here, mixed forms also make sense, e.g. a mechanical engineering company supplies the entire production line and the client is responsible for the hall and

earthworks. These interfaces are also easy to describe, so that the economic risk is manageable. So far, we have mainly dealt with administrative, contractual, technical and related aspects, but now we will turn to a completely different topic, namely: where will the money come from? Naturally, the easiest way is to provide the financial resources from your company. This will be the case in the rarest of cases, but should be mentioned for the sake of completeness.

Usually you will talk to one or more banks and if you present a meaningful business plan, financing will not be a problem. Your bank will also assist you with classic government ECA (Export Credit Agency) covered financing. The best known ECAs are the German Hermes, the French Bpifrance (formerly COFAS) or the Italian SACE. Which ECA is used depends to a large extent on the country from which the majority of the supplies for your project come. Even if the ECAs harmonize their requirements for the acceptance of projects in Europe, it can be interesting to compare the different ECAs, especially if a high percentage of local deliveries come from the host country, because, despite all vows, each country (still) has its own policy. The target countries are divided into different categories, on which the amount of the premium then depends. It should be noted that the ECA usually only covers the political export risk, not the commercial risk of the project itself. This can also be insured, but is rather uncommon, as it is expensive. This risk is not assumed by the state of the respective ECA, but private insurances come on the scene.

A special variant can be the financing by financial investors or family offices. The submission of a meaningful project description and a business plan are mandatory.

Another form of contract is the EPC M (Engineering Procurement Construction Management) variant. EPC M projects are usually found in smaller mechanical engineering projects - e.g. a production line for gas cylinders or an assembly line for household appliances. Compared to the EPC variant, the same services are provided, but with one major difference: there is no general contractor centrally responsible for everything. The client must therefore tender and award contracts for all the trades individually. For this purpose, he very often uses a consultant who coordinates and executes these activities, i.e. only manages them.

As described, in an EPC M contract, each individual trade, order or service is awarded individually. Depending on the

capabilities of the client, he will either use his own personnel, which he naturally lacks elsewhere in the company, or he will commission external personnel (freelancers) or an engineering company to do this. No matter how he does it, there are a lot of interfaces that have to be considered, for example, the installation planning of the individual machines and apparatuses has to be coordinated and agreed with the pipeline planning, the steel construction, the civil works, the electrical & instrumentation. If the plant is to be operated fully automatically in the future, there is also a process control system, which in turn has an influence on almost all trades. All this has to be right, because otherwise there will be collisions later on the construction site that will cost time and money to eliminate and will also disrupt the entire process.




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RE 4.) PROJECT FINANCING OF A COMPLETE INVESTMENT PROJECT INCLUDING DESIGN SERVICES, PROJECT MANAGEMENT, SUPPLIES INCLUDING TRANSPORTATION, CONSTRUCTION AND INSTALLATION, COMMISSIONING AND OCCASIONALLY A FIXED PERIOD OF TECHNICAL SUPPORT OR TRAINING OF THE CUSTOMER'S PERSONNEL

Previously, we looked at classic ECA financing. Project financing is a highly complex and costly type of financing and, due to the high upfront costs, is only worthwhile for large investments; below € 50 to 100 million investment volume, one should not even think about it. These projects can also be financed under ECA cover.

Project financing is nothing other than basing the risk of financing on the creditworthiness of the "special purpose company" (SPC) that is yet to be founded or has already been established, and not on its sponsors. Naturally, the expected cash flow plays a decisive role. A particularly large risk here is the construction period of the plant itself, because only when the plant is producing can it also generate cash and take on its debt service.

In order to be able to attract banks or other investors for such financing, extensive documentation must be prepared. These can be divided into 2 main categories and are the actual "documentation", so-called "professional opinions" and "guarantees".

Components of the "documentation" are among others a detailed business plan, the financial model, an insurance concept, a pre- or basic engineering with the main parameters of the plant, a concept for raw material procurement and distribution of the finished products as well as a description of the necessary regulatory approvals and how to obtain them. Professional opinions" are more technical documents such as soil surveys, studies of the raw material with respect to quality and availability, legal, tax, market and environmental impact studies, and sometimes external expert opinions on the technology used. "Guarantees" consider delivery and acceptance commitments, liquidity buffers of the shareholders involved if applicable, delivery and performance guarantees of the general contractor(s), as well as the contractual obligations of the corresponding contracts and, if available, the ECA coverages.

The time required to complete all of the aforementioned requirements can easily take 1 to 2 years and cost several million euros.

Now we will deal with practical examples, which differ from the usual standard and lead to success with some good will of all parties involved. The examples come from the mining and metallurgy sector and are suitable for projects where the investor is not so financially strong. The magic word here is "equity in kind".

In many regions of the world there are mostly older investigations about raw material deposits, this is especially true for the territory of the former Soviet Union but also for Africa. The problem is, that the deposits are known, but not their presumable occurrence. In order to build up a project financing, the deposit must be examined for its thickness and above all its yield, because potential investors want to know whether the yield will be sufficient for the planned lifetime of the industrial plant in which these raw materials are to be processed.

In most countries, it is relatively easy to obtain the rights to exploit a deposit and these rights are usually affordable even for companies that are not so financially strong. If the results of the deposit to be examined in detail turn out to be good, the equivalent value of the raw material can be included in the financing as "equity in kind," which basically means that the raw material serves as collateral for the financial loan to build the plant. Such constructs have been worked out, for example, in Angola to build a gypsum board plant or in Mongolia to process tungsten ore.

Unfortunately, there is one small drawback: the necessary drilling and studies for this phase are not quite inexpensive and must be paid for by the investor. However, money can be raised through venture capital funds. Almost all internationally active banks are involved in this.

Another interesting form can be the assignment of the rights to an ongoing production, e.g. to use an existing aluminum production from an older plant as collateral for the new aluminum smelter, as already realized in Iran years ago with Hermes cover.

As you can see, there are almost no limits to project financing, and with creativity and absolute transparency towards all parties involved, a lot can be achieved.

RE 5.) CROWDFUNDING

The wondrous thing about crowdfunding is that a large number of people are funding a project. In this case, the investor turns directly to the public, usually via a relevant platform, in order to win over as many interested parties as possible for joint financing. Whether a project is realized is therefore not decided by a traditional authority - such as a bank or funding institution - but directly by the crowd. The word crowdfunding is made up of the English terms crowd and funding. In Germany, this type of financing is also known as Schwarmfinanzierung.

In mechanical and plant engineering, this is very rarely the case, although banks occasionally use this means to finance the necessary preliminary studies (as listed under 4). The banks then assume that if the crowd finds a project good, it will also be economically viable and thus pass on some of the risk to themselves, according to the motto that the crowd will have already checked it out. One can certainly argue about the seriousness, which is why crowdfunding plays at best a niche role in the financing of machinery and equipment projects.



DIRK UDO FRICKE

Dirk Udo Fricke supports ALPHA GmbH as an independent consultant in securing financing for ALPHA's projects. He is holding a diploma in process technology and has passed an apprenticeship in foreign trade. Before starting his consulting business in 2016, he has served in several management positions mainly in sales and project execution of mid to major industrial projects in the oil, gas, chemical, petrochemical as well as mineral, metalworking, environmental and energy industry. Among others, he worked for engineering and construction companies like Salzgitter, Mannesmann or Ferrostaal. His main regional focus was the MENA region as well as the eastern hemisphere but he also managed jobs in Africa (Angola, South Africa), Asia (Indonesia) or South America (Brazil). Due to the magnitude of his projects, financial engineering was always a key success factor for the realisation of the projects, thus he still maintains quite substantial contacts to the international financing community.




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THE ICEBERG MODEL OF TECHNICAL REGULATION ACTIVITIES

RECOGNISE THE VALUE!

THE ESSENCE AND ROLE OF TECHNICAL REGULATION

Technical Regulation is a relatively new term and it is used to describe different aspects and activities on an operational level in a company and on a strategic level in the standardisation world. The strategic perception of this term includes regulatory issues of policy and public institutions that establish certain rules, enforce them in society and industry and ultimately control the monitoring of them.

In some multinational companies, like Siemens, MAN Energy or Flender, new types of departments have emerged that carry the term "Technical Regulation" in their name. "What do you do there?", want some curious colleagues to know. "Certification!", "Approvals!", - answer those who think they know what is Technical Regulation about. "Well, we establish certain rules in the company that affect us through regulation!", answer the employees working in the TR departments.

Lots of companies can not afford such departments and in most cases, there is actually no need for such exotic constructs, esp. if particular foreign destinations have a single project approach. In such cases, it is more efficient to use the services of a specialised consulting company that brings the knowledge and the experience.

The full range of possible activities and thus the true importance of such a topic as Technical Regulation and therefore those possible services are often not really recognised. Technical Regulation is not just about Certification and Permissions, there are so many aspects of its contribution to different activities within a company that are "under water" and seem not to be visible to some participants as emphasized in the Iceberg Model. As a result, companies lose enormous potential for making their processes more efficient. Because, if the topic of Technical Regulation is perceived in its complexity, if one thinks strategically and looks at it holistically, it becomes clear that Technical Regulation is:

- AN ENABLER FOR THE EFFICIENT MANAGEMENT OF AN ENTIRE PROJECT,
- A TOOL FOR COORDINATING THE WHOLE SUPPLY CHAIN,
- AN INSTRUMENT OF CORPORATE MANAGEMENT.

Therefore, the interdependencies between the individual departments, divisions and Technical Regulation must be recognised and specifically targeted to create the best possible value for the whole project and the whole company as such.



TECHNICAL REGULATION ACROSS VARIOUS CORPORATE FUNCTIONS

■ SALES

Knowledge of the normative-legal situations in the customer's target country can give an enormous advantage over competitors. Already in Sales, Technical Regulation can give impulses and shed light on the special features of the realisation of projects from a normative-legal point of view, thus gaining plus points. It is also important to understand, that by far not every client is aware of

these special features in their own country. Highlighting them in sales negotiations shows the far-sightedness of potential partners and sets one's own company apart from the crowd. Moreover, the customer always feels "in good hands" if such licensing and certification issues and related activities are known to the partner, or if they can address the issue intensively themselves.

■ HUMAN RESOURCES

Technical Regulation also supports the HR department in qualifying staff. This can lead either to improved quality of decisions or also of products. In addition, some qualifications are the prerequisite for the realisation of a project, especially in such cases where only appropriately trained personnel can be admitted (e.g. for project plan-

ning activities, assembly or acceptance tests). Through this kind of training of one's own team, the company creates an enormous advantage not only in the execution of the project but already in the acquisition.

■ CALCULATION

Calculation of time and costs is essential to all planning activities. Particularly in international large-scale plant construction, a well-founded calculation of the expenses for the project is decisive in order to be correct both in the offer and in the execution of the projects, which often last several months or even years. An incorrect calculation can lead to bids not being taken into consideration or to awarded projects not being carried out within the planned financial framework. Therefore, already when

calculating the expenses, the costs for conformity with all legal and normative requirements must be considered in addition to the man-days and equipment costs, logistics or documentation costs. And this means that the costs for the correct documentation, for the certification procedures, including audits and on-site inspections, must also be taken into account. And the references or data for this are again provided by the Technical Regulation.

■ PLANT ENGINEERING

In the same way, the Technical Regulation forms the basis for the further procedure already in the initial phase. We are all familiar with situations in which the basic engineering suddenly has to be revised for the detailed design because certain requirements, such as distances between equipment, width of auxiliary structures or classification

of hazardous areas, have not been planned in accordance with the applicable regulations. Therefore, normative-legal particularities are essential in order to plan sustainably, to have lean engineering, not to have to "touch" the same topic/document twice and not to produce waste.

■ DIFFERENT ENGINEERING DIVISIONS

In all divisions of a plant construction company, whether it is mechanical engineering, pressure vessels, electrical engineering, measurement and control technology, or Package Units (PUs), there are a lot of regulations that have to be taken into account during planning and in communication with certain partners. These can concern the design of the equipment, provide information on the scope of testing, represent calculation requirements (strength calculations) or also determine the choice of control, auxiliary

and measuring devices. It is important to see the whole picture. Thus, when choosing the measuring equipment, it is important to consider not only the cost of the product, but also the existence of test protocols, calibration methodologies, the availability of test media and test equipment in the target country, or even the approvals of the customer's internal test laboratory. This saves additional costs, reduces the time for compliant commissioning and facilitates future operation at the customer's site.

■ QUOTATION

In Quotation Management, similar to Sales, the topics of Technical Regulation must be present. First also for oneself. As a plant constructor, you have to be aware of what a specific project in the respective target country entails in terms of expenses. What additional tasks or issues need to be taken care of or considered? Which activities have to be taken over by the own company and which can be handed over to the suppliers? What requirements does

the customer have to fulfil, or how and where can the customer support my company with certain issues in order to reduce costs for both parties? However, this is also an issue for the customer - who may not even consider these aspects when tendering. And the knowledge of TR and its clear placement in tenders can be my Unique Selling Points (USPs), a feature that distinguishes me from other competitors and gives me an advantage.

■ PURCHASING

Technical Regulation contributes enormously to the quality of purchasing decisions. This is because it ensures that the right requirements are placed on suppliers and that normative-legal features to be fulfilled also supplement the specification of the products. TR ensures also that the topics and aspects necessary for conformity assessment or for obtaining approvals are addressed and

■ SUPPLY CHAIN MANAGEMENT

Logistics aspects are also not feasible without Technical Regulation. The specificity of the route to the supplier, the time needed to realise the project, as well as customs issues, need to be considered. These include not only the type of packaging and the type of information but also the provision of the right documentation for customs clearance for international projects. This is not just about making sure all the "paperwork" is there, but that it is filled out correctly and that information is accurate.

■ COMMISSIONING

Commissioning is not only about successfully carrying out the test run but also about making the number and type of necessary documents available to the competent authorities. In addition to the operating instructions, test protocols, quality documents, strength calculations or measurement data, as well as numerous special data sheets, there are also the test methods with all the parameters that need to be checked during commissioning.

■ QUALITY MANAGEMENT

Quality Management is also unthinkable without Technical Regulation. This is because the quality of each product is not only determined by the quality criteria of the manufacturers themselves but also by the regulated aspects in normative-legal requirements. Ultimately, quality

■ PROJECT MANAGEMENT

The management of a project can not be done without aspects of Technical Regulation. In fact, Technical Regulation can provide guidelines for managing projects. How the departments work together, how suppliers and customers are involved, which steps are to be planned in

■ DOCUMENTATION

Every plant engineer knows this: you don't just deliver the plant, but a lot of the documentation. And if many companies and authorities now do without physical documentation and there is no need to "ship" trucks full of documents to customers and inspection authorities, these must also be created and coordinated digitally. The amount of documentation is overwhelming in any project. Because it's not just about managing your own documentation - from Basic to Detailed Engineering - and keeping it up to date at all times, but also about creating and keeping documentation for authorities, test centres, and customs matters, in order to be able to track all complaints. And in addition, a large amount of the

explained during negotiations. Ultimately, Technical Regulation can support the purchasing department in evaluating and assessing the offers submitted by suppliers and thus ensuring that correct purchasing decisions are made and that the Total Cost of Ownership (TCO) is taken into account when awarding contracts.

Unfortunately, with numerous suppliers and complex supply networks, it often happens that certain information in the documentation does not match that on the packaging or even on the product label. This then leads to delays at customs or legal proceedings at the border or during product launches. Therefore, here too, the Technical Regulation organising expediting of suppliers prior to shipment provides active support.

Often, these methodologies must also be approved in advance by the responsible bodies. In addition, the test runs must be registered and coordinated with the responsible authorities and test centres so that, in the case of larger plants, various bodies are present at one location at the same time. This coordination of activities is organised by those divisions or service partners responsible for Technical Regulation.

encompasses not only the quality of individual products but also of the individual processes, such as correct storage, correct transport, correct packaging, correct labelling, correct assembly, correct test formats with correct test procedures and media.

general during project realisation and how progress is to be evaluated - all these aspects are also provided and monitored by the Technical Regulation and thus form the sound basis for project management processes.

documentation falls to numerous suppliers of hundreds of components for the engineering company, which must also have a structure, preferably the same one as that of the client, to ensure the existence of the necessary documents and be checked for their correctness. This is also the basis for any conformity assessment, registration and approval procedures of a product or of the complete plant. In order to achieve the sustainability goals, not only the plant constructors but also the operators have the obligation to measure or determine their CO₂ impact. This is only possible with proper documentation that masters the issues of Technical Regulation.

CONCLUSION

Technical Regulation thus provides a source and a tool for effective Project Management. It is not something that is required only at the end of the project, before shipping or before putting the product or the plant into operation, but a structural unit and task that should be implemented in various processes of the plant-engineering project from the very beginning. A company should deal with the issues of Technical Regulation even before the contract is signed. This is because knowledge of these issues can enable a company to be successful in the acquisition of projects and to determine the scope and costs correctly from the very beginning.

Technical Regulation should be seen as an independent discipline, but much more as the thread that brings and holds everyone together and views the projects and activities in the company and across the whole supply chain as a whole. Experience shows that the complexity of the international markets (customers and suppliers) to be served is so huge that very specific know-how is required. This expertise saves time for the implementation of the idea, for the execution of the project and saves costs. Therefore, the topic of Technical Regulation should not be underestimated, so that efficiency could be achieved along the entire supply chain from the very start.

Technical Regulation is also the basis for the Compliance activities of a company. And especially Technical Compliance can only be achieved if all normative-regulatory requirements are considered at all stages of project execution. Above all Technical Regulation contribute to the Sustainability debate as it delivers Conformity with regulation, encourages cooperation (SDG 17) and ensures economic stability by eliminating waste, but also social and environmental robustness through the safety of hazardous equipment and plants subject to monitoring.

Modern management theory calls for breaking through the boundaries in companies, for a holistic approach to projects and activities, eliminating silo thinking, merging diverse structures of a company, or making clear the interdependencies of the respective structures and how they are influenced by one another. This in turn leads to the fact that work on certain topics is or should be done across departments. Technical Regulation can therefore be that topic that promotes cooperation between various departments in a plant engineering company, between various partners in the supply chain and various stakeholders in society, thus achieving more sustainable results.

So, let us embrace the topic of Technical Regulation as an instrument for the holistic approach to our projects and our working together that creates value and strives for efficiency and sustainability in our activities across all structures.



PROF. DR. JULIA KRAUSE

Julia Krause is Dean for Master International Management and holds the chair for "International Industrial Sourcing & Sales" at Dresden University of Applied Sciences for Economics and Technology.

In her teaching and research, she focuses on issues of technical compliance and holistic sustainability in corporate processes and along the supply chain. These interests are based on her many years of experience in management consultancy and international plant construction. With a diploma in philology, and a master's degree in economics with a focus on production management, she received her doctorate from the TU Chemnitz, Chair of Public Law, on regulatory issues in investment projects.

She is involved in the harmonisation of standards within projects in the Committee on Eastern European Economic Relations and in GIZ. Inclusive communication and creativity in the design of business processes, as well as in education, are other key areas of her research and activities.

With her "NACHTIGALL" project, she advocates for the "holistic" implementation of sustainability goals in global plant engineering projects.

NEW CHALLENGES IN PLANT ENGINEERING: GREEN HYDROGEN WITH THE FOLLOW-ON CHAIN GREEN STEEL PRODUCTION



It's been all over the news recently: Swedish company "H2 Green Steel", is building a green steel plant in the small town of Boden, Sweden. The plant will process raw materials from the Norrbotten region and integrate the built facilities with nature. The steel will be produced with green hydrogen, instead of carbon.

The Swedish steel group SSAB produced and delivered the world's first fossil-free steel to a customer as early as August 2021. The trial delivery was seen as an important step towards a completely fossil-free value chain for iron and steel production and a milestone in the stakeholder SSAB, LKAB and Vattenfall. The first customer to whom the steel was delivered was the Volvo Group.

Unsurprisingly, Sweden is the market leader in the production of green steel, even if no valid global market figures are available. So what is special about this project and how could ALPHA pass on its knowledge and experience as an engineering service provider as best practice?

Green steel is steel produced using hydrogen instead of carbon. In this process, iron ore is reduced to a solid sponge iron in a process called direct reduction, which is then refined into crude steel in an electric arc furnace. This process avoids the generation of CO₂ that is produced in conventional steel production with coal.

The direct reduction technique is already used on a natural gas basis, but with green hydrogen it is even more environmentally friendly. It is a process for producing pig iron. In this process, iron ore is converted into sponge iron with the help of a reducing agent. The reducing gas dissolves the oxygen out of the iron ore without it melting. The process with green hydrogen takes place in the direct reduction plant at overpressure and around 1,050 °C. The process uses neither fossil fuels nor emits carbon dioxide. In conven-

tional steelmaking, most carbon dioxide emissions come from the use of coke to remove oxygen from the iron ore.

By replacing this process with a direct hydrogen-based reduction process, coal is completely removed from the equation. While today's units mainly use natural gas and therefore emit roughly half as much CO₂ as blast furnaces, the plan for the future is to use more and more hydrogen - green, of course.

Green steel has several advantages. Green steel contributes greatly to the reduction of overall emissions from steel-intensive goods and there are no CO₂ emissions from steel production. Green steel is made with hydrogen instead of carbon and also offers other advantages from material properties because there is no phosphorus and sulfur. Cleaner production

methods can help avoid direct emission costs, but they involve high investment and operating costs, making it difficult for green steel producers to access the market.

An important disadvantage of green steel is that the processes for its production are still rather in the development stage. The production of low-emission steel will be considerably more expensive than conventional manufacturing processes. The end-product price of many steel-intensive products such as cars, wind turbines or machinery could rise sharply if they are made entirely from green steel.



GREEN HYDROGEN - SYMBOL OF THE ENERGY TRANSITION

Green hydrogen is produced by the electrolysis of water, with the energy required for electrolysis being generated from renewable sources such as wind or solar energy. The only waste product is oxygen, which is released into the air. Green hydrogen is considered the only true environmentally friendly, climate-neutral way to produce hydrogen and design downstream chains. Green hydrogen is therefore an energy carrier that is produced from 100% renew-

able electricity and produces no CO₂ emissions. It can be used to fuel fuel cell trucks, which emit only water vapor, or as fuel for aircraft and ships.

Modern GUD power plants could also be operated with hydrogen. In industry, it can be used as an energy carrier or raw material. With green hydrogen, for example, the steel industry could dispense with coal or processes for hydrogenation could be operated.

One disadvantage of green hydrogen is that it is more expensive to produce and procure than fossil-based hydrogen. The production of hydrogen is costly and requires specialized equipment, resulting in high acquisition and project costs. For this reason, renewable hydrogen must follow a similar path of cost reduction and scaling as other new technologies that are now commonplace.

PROJECT FLOOR – ALPHA EXPERIENCE REPORT AS BEST PRACTICE BASIC KNOWLEDGE

One should not be under any illusions: Hydrogen is very dangerous because of its high flammability. It is 14 times lighter than air, which means it can spread quickly and cause fires when heated. Hydrogen is invisible, odorless and cannot be felt, which is another disadvantage. With liquid hydrogen, there is a risk of fire mats forming at the scene of an accident. Therefore, high safety standards must apply when handling hydrogen, as there is a risk of dangers such as explosions or hydrogen embrittlement.

ALPHA itself has developed practical concepts here and has already implemented them with plant manufacturers in the field of green steel production in soil and other concepts. For example, one task was to define the regulatory framework of a green hydrogen plant for green steel production and to implement it in the project.

The basic ideas will be outlined here:

1. There are many norms and standards for hydrogen developed by different organizations and countries. For example, even Sweden has some national standards. A binding uniform system does not exist.
2. Inconsistent mandatory national standards for hydrogen are the sad rule in Europe. For example, Sweden uses SS (Swedish Standards), often with the addition of SS- ISO or SS - EN, but not always. In addition, there are the national mandatory standards, such as the Swedish Electrical Safety Act 2016: 73 or also the AFS standards, associated with occupational safety in Sweden. The European Commission and, for example, the German government have adopted the European Hydrogen Strategy and the National Hydrogen Strategy, respectively, as an attempt at standardization. These national strategies aim to support the development and use of hydrogen technologies and to promote the energy transition in industry, transport or the heating sector.
3. For the successful implementation of the respective National Hydrogen Strategy, recognized measurement methods and evaluation criteria as well as the associated international norms and standards are required. Through early recognition and application, for example in the development, design or manufacture of products and processes, essential measurement methods and requirements can be defined and planned.
4. There are various standards and regulations for explosion protection when using hydrogen. An example from Germany: BAM (Federal Institute for Materials Research and Testing) is concerned with the safe operation of hydrogen plants as well as the safety of processes for the production, transport and conversion of liquid and gaseous hydrogen and hydrogen mixtures. BAM focuses on the safety-related properties of hydrogen or hydrogen mixtures, explosion protection, impact considerations in accident scenarios and the design of safety-related measures and concepts.
5. According to European directives (ATEX), the use of hydrogen and hydrogen mixtures requires that explosion protection measures be taken. The explosion protection measures are divided into primary (avoidance of explosive mixtures), secondary (avoidance of ignition sources) and design measures¹.
6. IECEx is an international system for the certification of equipment for use in potentially explosive atmospheres. However, there are no specific IECEx regulations that apply exclusively to hydrogen. Instead, there are general regulations and standards for explosion protection that also apply to hydrogen applications.
7. There are several standards for green hydrogen that relate to emission limits and the type of renewable energy used to produce hydrogen. One example is the Green Hydrogen Standard¹² developed by the Green Hydrogen Organization (GH2). The standard requires that green hydrogen projects operate at ≤ 1 kg CO₂e per kg H₂ (averaged over a 12-month period). The standard defines green hydrogen as hydrogen produced by electrolysis of water using 100% or near 100% renewable energy and near zero greenhouse gas emissions (≤ 1 kg CO₂e per kg H₂ averaged over a 12-month period). The standard refers to technologies such as hydropower, wind, solar, geothermal, tidal, wave, and other ocean energy sources.

8. The selection of pressure vessels for hydrogen and other storage methods depends on the mobile or stationary requirements, the stability of the materials used, the amount of hydrogen to be stored and safety aspects. There are several types of pressure vessels for hydrogen storage. The most common are Type I metallic pressure vessels that can store gas up to a pressure of 20-30 MPa. There are also other standards such as the ASME B31.12 Standard for Hydrogen Piping and Pipelines, which includes requirements for piping in gaseous and liquid hydrogen service and pipelines in gaseous hydrogen service.
9. Standards for measuring equipment in hydrogen applications vary. One example is ISO/TC 197, which deals with the standardization of systems and equipment for the production, storage, transport, measurement and use of hydrogen. There are also other organizations such as Fraunhofer IPM, which develops measurement technology for a safe hydrogen infrastructure. The safety of the hydrogen infrastructure is of particular importance and all steps in the process - from production to storage and distribution to conversion of hydrogen - must be safe. H₂ sensors that measure reliably and sensitively are important components of safety and warning systems for monitoring the hydrogen infrastructure.

CONCEPTS IN THE CHAOS OF AN UNREGULATED PLANT ENGINEERING AND SALES MARKET

It is worth looking at the process from the consumer side: So far, green steel has therefore been more of a concept and, for some manufacturers, does not refer to the entire production chain. For example, it is not enough to declare parts of it as "green" and keep the rest of the production just as emission-rich as before. The production itself is not made transparent.

In our consulting activities as an engineering service provider, we have developed the following simplified catalog for our customers in order to achieve truly green steel in sales here:

- Inquire about the production methods, especially the reporting procedures, on which the green steel is based.
- Let us explain the value chain to you.
- Are there environmental certificates or declarations? If yes, on which testing methodology are these based? Who has tested and issued them?
- Review the documents on carbon dioxide emissions. Are there any expert reports on this?
- Are the statements based on transparent and clear key figures?
- Are there alternatives to the offer?

ALPHA
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MAKE THE WORLD A LITTLE BETTER EVERY DAY WITH ENGINEERING SERVICE QUALITY!
GREEN SOLUTIONS FOR POWER - TO - X/FOLLOW CHAINS.

Currently, there is no internationally recognized standard for green steel production. However, there are initiatives by governments worldwide to regulate steel production to make it more environmentally friendly. One example is ResponsibleSteel, an organization that advocates that the term “green steel” should take into account not only greenhouse gas emissions, but also a wide range of social, safety and environmental issues. They believe that steelmakers who want to demonstrate social and environmental responsibility must show how they are responding to the challenges of climate change and how they are addressing other important social and environmental challenges.

This holistic way of thinking creates follow-up tasks that we as ALPHA engineers are aware of: Not only the climate neutrality of green steel production has to be presented, i.e. not only the focus on technology, but also the framework conditions up to the supply chains. A mammoth task that combines technology and social issues with biodiversity. Steel producers currently have three options: wait and “drink tea,” invest in carbon capture and storage (CSS) solutions, or switch to cleaner production processes such as direct hydrogen-based iron reduction. One example of such a solution is the Carbon2Chem technology used by thyssenkrupp. The on-site metallurgical gases including CO² are processed directly into new raw materials.

In the course of our ALPHA consulting work, it was clear that the challenges are partly unregulated, sometimes messy but always rewarding, as emissions can be drastically reduced by replacing coal or gas with green hydrogen. This is an important technological pathway to achieve true sustainability and decoupling, even if the acceptance of potential buyers is scarce due to the high final price and the regulatory question remains open. Consultative support by an experienced engineering service provider with great experience in the implementation of the regulatory framework is particularly important to achieve technical compliance.

The practical and bold answer: Swedish company H2 Green Steel will produce high-quality green steel at its fully integrated, digitized and circular plant in Boden (northern Sweden), reducing CO² emissions by up to 95 percent compared to traditional steel production. With an investment of 2.5 billion euros, the plan is to produce 2.5 mill tons of the green steel annually from 2026 and 5 million from 2030. Concepts for the sale of green steel have been drawn up and the demand for it is there, and not just among environmentally conscious buyers in the steel trade.

DR. THOMAS KRAUSE

Dr. Krause has been CEO of ALPHA Consulting GmbH since 2008. Before that, he worked in various management positions, e.g., at TÜV Rheinland. He is an active member and in the leadership of various national and international standardization and technical regulation committees, for example on the harmonization of technical regulation between the EU, Uzbekistan, and Kazakhstan or the State digitalization committee between Indonesia and Germany. He is the author of various publications and practical guidance for plant engineers, such as on safety of machinery and equipment in Uzbekistan, Kyrgyzstan; or Vietnam, on application of hydrogen or on green technology in the EU or China. In addition, he drives new technologies and digitalization in plant construction and operation, currently with a commitment to green steel, hydrogen, certification data management solutions and protecting critical industrial assets from malicious attacks.



CONFORMITY ASSESSMENTS IN CHINA – NEW REGULATIONS FOR MARKET ACCESS

We, ALPHA Consulting, would like to inform our customers about important updates regarding safety regulations for certain imported goods in the People’s Republic of China. The China Regulatory Authority for Market Supervision (SAMR) has announced changes and additions regarding the licensing of Special Equipment and Explosion-Proof Electrical Equipment in Documents No. 41 of 2022, No. 17 of 2021 and No. 34 of 2019.

1) New regulations for imported pressure piping components.

In accordance with Article 14 of Documents No. 41 of 2022, SAMR has ordered that manufacturers of imported pressure piping and pressure piping valves must apply for a production license for Special Equipment of the People’s Republic of China from June 1, 2022. The affected categories are A and B for penstock pipe and A1, A2, B for penstock valve. However, obtaining the production license is not the only step to consider. Manufacturers must also pass the required type test as well as inspection of manufacturing in accordance with the relevant safety specifications. Compliance with these regulations is critical to ensure the import and distribution of these products in China. A transition period has been established until May 31, 2024, within which manufacturers must obtain the necessary licenses and testing.

2) New certification scheme for explosion-proof electrical equipment.

For explosion-proof electrical equipment listed in the 3C catalog, SAMR has made a change to the certification requirements. Until 2020, two certifications were required: the explosion protection certification and the 3C certification. However, since 2020, only one certification is required, the CCCEX certification. This simplification of the certification process will make it easier for manufacturers of explosion-proof electrical equipment to make their products available to the Chinese market. However, it is important to note that explosion-proof meters still require both a CAP certificate and an explosion-proof certificate to meet safety requirements in China.

We recommend that our customers inform themselves in good time about the new regulations and take the necessary steps to comply with the safety standards for their products. This will help to ensure smooth business operations and access to the Chinese market. Our ALPHA experts are available to assist you with this process and clarify any questions you may have.



LISONG TIAN – PROJECT MANAGER

Lisong Tian has joined ALPHA GmbH in 2017 as a project assistant. In his current role as project manager, he consults companies in the field of certification for the Chinese market. With his German educational background in mechanical engineering and his Chinese cultural background he is committed to build a smooth “certification bridge” connecting Germany’s and China’s markets.

Education:

B.Sc. Mechanical Engineering, Technische Universität Chemnitz, Germany 2020

SFI.IWE. International Welding Engineer, DVS Halle, Germany 2019

B.Sc. Industrial Design, Jiangsu University of Technology, China 2015

B.Sc. Financial Accounting, Jiangsu University of Technology, China 2015

APPROACHES

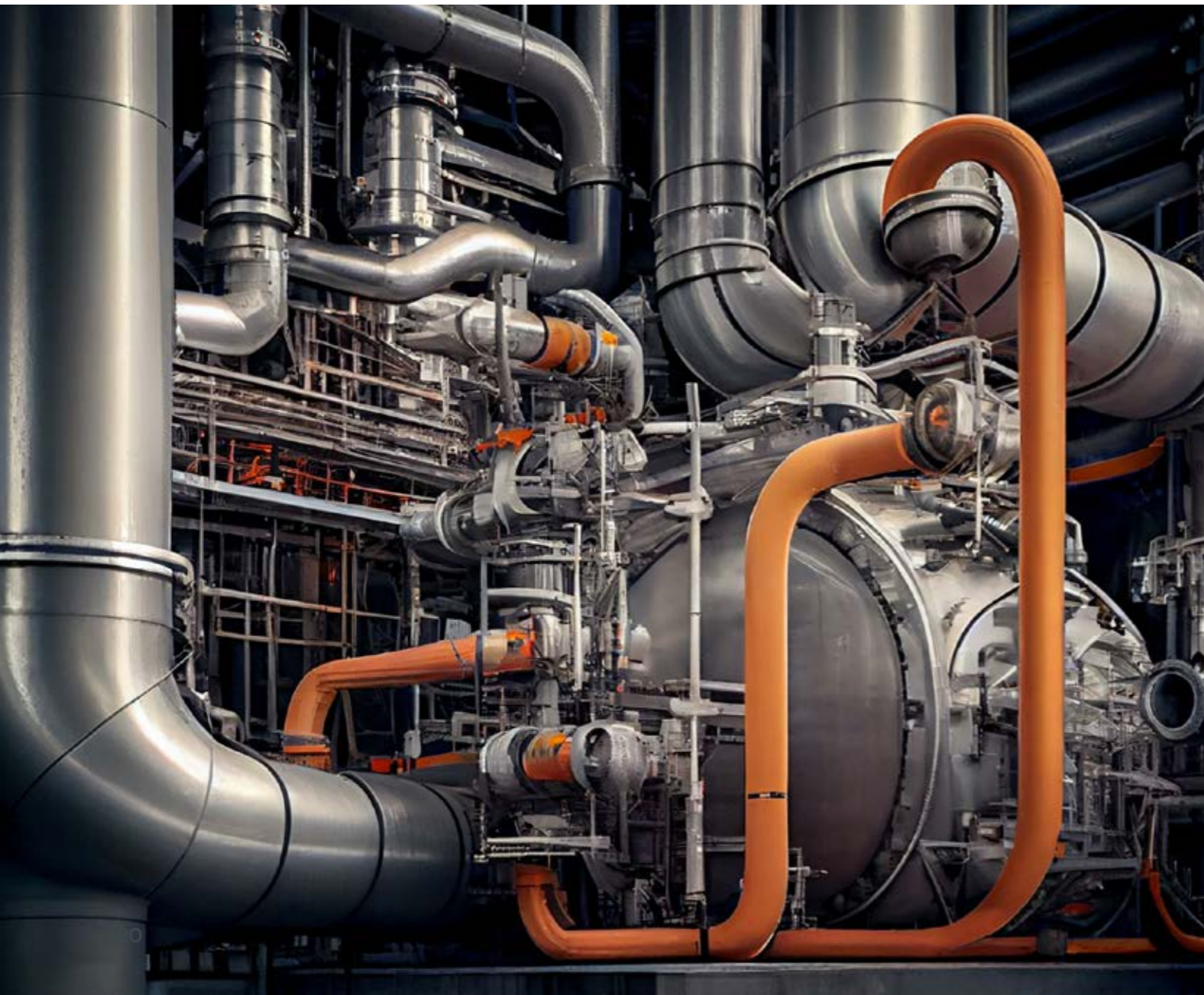
TO COST REDUCTION WITH SIMULTANEOUS TECHNICAL COMPLIANCE IN PLANT DESIGN AND CONSTRUCTION

The planning, construction and commissioning of plants is a complicated process that requires large financial and time resources and involves a large number of trades and organizations. Often the area of technical regulation, certification and approval is underestimated, according to the motto "this is auxiliary work" or "it will work out somehow". Connoisseurs of plant engineering know that the costs for certification and approval are be-

tween 5 and 9 % of the total volume of expenditure for a plant, i.e. for a plant in the chemical industry with an investment volume of USD 260 million, this means costs of USD 23.4 million for this "ancillary work", generated by the operator and indirectly via the suppliers in the supply chain. If the technical compliance is not met, penalties and additional costs in the multiple millions can be added. The question here is, can costs and expenses be

designed to achieve technical compliance in your project in a way that is compliant with the rules while meeting hard cost and schedule targets or achieving cost savings?

Here are some tips for successful implementation and simultaneous cost savings, based on our successful consulting activities for plant manufacturers since 1998.



- Prepare a clear and understandable concept of technical regulation for yourself as a plant engineer in project management, but also for all suppliers of main components (turbine, compressor, etc.) and critical equipment (pressure vessels, lifting equipment, safety fittings, fire safety equipment) together with purchasing.
- Send this concept to all stakeholders of the project even before you start purchasing.
- Discuss these requirements in purchasing meetings with all suppliers.
- Note that many standards are harmonized in many countries (e.g. GOST ISO) or there may be simplified approval for equipment. For example, for explosion-proof equipment with IECEx, a shortened KOSHA approval can be achieved in Korea, since the test protocols are mutually recognized.
- Do not get involved in "shortened paths" and "we'll take care of it". Only strict adherence to compliance will ensure savings success by the end of the project.
- Check your suppliers in the project with regard to the certification schedule. Certifications can take 6 or more months (South Africa, Indonesia).
- Secure a workable model of approvals. The key to this is the certification scheme chosen. Unit - certification (similar to ATEX) allowed in many countries could be a minimizing factor of costs.
- Note in which target areas international norms and standards are recognized. The best example here is the question, ATEX versus IECEx, but also whether there are national specifics. Even in the European Union there are, for example for gas equipment in Poland or for electrical equipment with the AFS in Sweden. In Asia, the question is increasingly whether CCC and SELO requirements are recognized outside of China.
- Check all certification and testing companies in the country for compliance. A formal accreditation certificate is not sufficient for this. Furthermore, you need to find out whether the testing body has testing equipment at all. This avoids reissues.
- Find out if you can use your own test protocols and expertise.
- Rely on digitization in data preparation for certification to get the data overview quickly and cost-effectively. Ideally, your consultant will bring his own digital tools.
- You can't get good, compliant certification for free. Beware of avoidable bargains on testing. Often you do not receive the required conformity documents - for example, no test records - but you need them for successful certification and commissioning. A certificate of conformity without documentation is not sufficient in any country in the world, but is often offered. It is only years later during commissioning that high costs then arise due to necessary reissues.
- Also check your external certification service providers for compliance, skilled personnel, digitization and, most importantly, their necessary engineering knowledge. Conspicuously low-cost services are usually a sign of a lack of understanding of your project and generate error avoidance costs later on.
- Strictly adhere to national and international norms and standards, as well as the rules of compliance, to avoid subsequent claims, delays in commissioning or even legal consequences.

These are just a few points that should help you to successfully design your project in the field of certification and to reduce costs in the process. The key to success is regulatory compliance and this is also an important selling point in an increasingly fierce international competition for plant manufacturers.

Many hurdles can only be overcome with external service providers who have the engineering knowledge, know the certification and approval processes in the target countries, understand and can apply international standards and norms, use digitization as a tool in project management, have communication skills, and strictly adhere to compliance and supply chain laws.

KAZAKHSTAN

HIGH POTENTIAL FOR PLANT ENGINEERING COMPANIES

When I think of Kazakhstan, three things spontaneously come to mind: earthquakes in Alma-Ata, the highest ice rink in the world "Medeo" (1691 meters above sea level) and last but not least the spaceport "Baikonur". After all, in the summer of 1978, the first German, Sigmund Jähn, launched from Baikonur in the space capsule "Soyuz 31" to the orbital station "Salyut 6".

Since the 1980s, we have been hearing more and more about Kazakhstan, a country with a rich history and rapid economic and cultural development. The question often arises: What can our plant manufacturers do with Kazakhstan? A brief overview should provide a few impulses in this regard.

With an area of over 2,724,900 square kilometers, the landlocked Central Asian country of Kazakhstan, which has no access to the world's oceans, ranks ninth among the world's largest countries. By comparison, Germany fits 7.5 times inside Kazakhstan. The population is about 19 million people. In terms of area, the average population density is therefore low. Only about seven inhabitants live per square kilometer in Kazakhstan, while in Germany, with a population of about 83 million, there are 232 per square kilometer. The birth rate in Kazakhstan is 23.50 per thousand, while in Germany it is 9.60 per thousand.

From ancient times to the 20th century, various empires arose on the territory of Kazakhstan. The Mongols under Genghis Khan conquered the country in the 13th century, as did the Uzbek Tamerlan in the 15th century.

Before the Kazakh nomads subordinated themselves to the Russian tsar, they belonged to the nomadic steppe empire of the Jungars. Developed into the independent Union Republic of Kazakh SSR in the Soviet Union from 1936, Kazakhstan became an independent state from the Soviet Union on December 16, 1991.

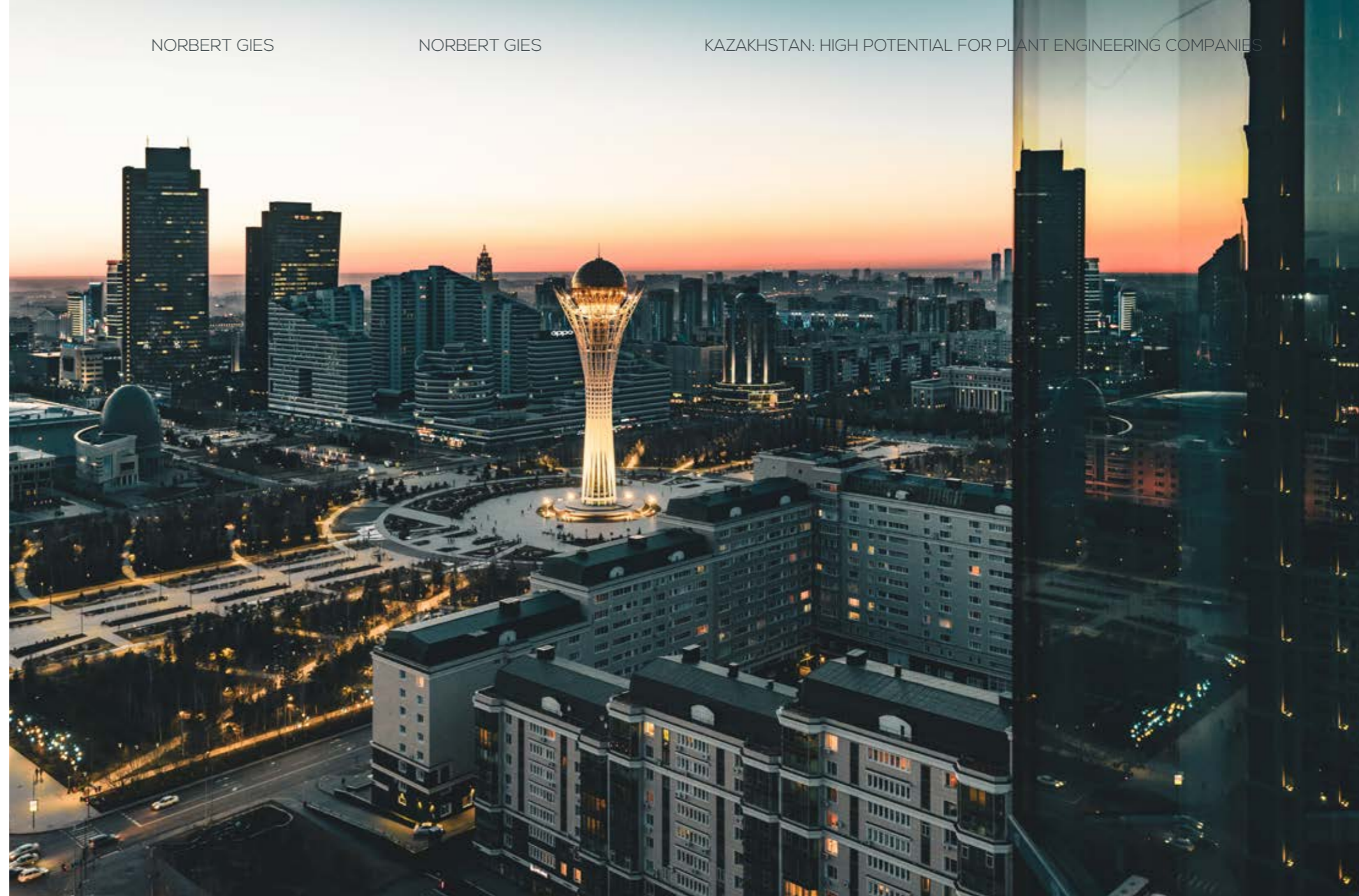
In 1997, the seat of government and parliament was moved from Almaty to Aqmola, located about 900 kilometers as the crow flies north of Almaty, which was then proclaimed as the official capital and renamed Astana ("capital") a year later. Reasons for the move included the earthquake-proof location around Astana and the possibility of erecting new, tall buildings along the lines of those in the Gulf states.

POSITIVE DEVELOPMENT OF THE ECONOMY

Kazakhstan is a mining-industrial developing country. It is rich in mineral resources such as oil, gas, hydrocarbons, copper, iron ore and uranium. The extraction of crude oil, natural gas, and lignite and hard coal are of particular importance. As an "economic engine," they traditionally account for a large part of Kazakhstan's economic output and exports.

After the Kazakh economy contracted by 2.6% in 2020 due to low raw material prices and the pandemic, this slump was recovered as early as 2021.

Numerous government support measures for the economy, higher raw material prices and robust domestic demand resulted in economic growth of 4.1% in 2021.



Current growth prospects are good despite the war in Ukraine and close economic ties with Russia. The economy is forecast to grow by an average of 3 to 4% through 2026. According to the survey "Kazakhstan 2023" in the booklet of the Embassy Republic of Kazakhstan in Germany, the gross domestic product (GDP) in 2021 per capita was 10,369.00 US dollars and will increase to 12,306.76 US dollars in 2023.

The forecast for 2028 is 15,040.47 US dollars. The average minimum wage is about 312,011 Kazakh tenge (KZT), equal to about 634 EURO. The highest monthly wages of about 592,292 KZT, equal

to about 1,200 EURO are paid in the mining and extraction industry. The monthly minimum wage is 60,000 KZT, equal to about 122 EURO.

The current unemployment rate is 4.9%. Like everywhere else, Kazakhstan is struggling with a shortage of qualified workers.

As early as May 2013, the concept of the "green economy" was propagated, which envisages not only a diversification of the economy based on alternative and environmentally friendly energies, but also a reform of the agricultural and industrial sectors using advanced technologies.

It is expected that the transition to the "Green Economy" will lead to GDP growth of 3% and approximately 500,000 new jobs.

On January 01, 2015, the Treaty on the Establishment of the Eurasian Economic Union (EEU) entered into force.

Kazakhstan, as a founding member, was concerned with creating the free flow of goods, services, capital, investment, and labor through a single market.

In the same year, the EEU signed the first free trade agreement with Vietnam.

On the "Kazakh Economy Day" in Munich on January 31, 2023, as well as on February 22, 2023, at the event "Kazakh-German Round Table" at the Embassy in Berlin, the Ambassador of the Republic of Kazakhstan, Dr. Nurlan Onzhanov, stated that Kazakhstan is changing positively every day and dynamic development is taking place. In his respective speeches he referred to the already long and intensive cooperation in the machinery and plant engineering industry between Germany and Kazakhstan. In the last 9 years alone, the total volume of machinery and equipment exports has increased ninefold, from 600 million to 6.4 billion US dollars.

WORTHWHILE INVESTMENTS FOR FOREIGN PLANT MANUFACTURERS

Project business has traditionally been an important part of the business activities of German companies in Kazakhstan. The Kazakh government's intention to be climate-neutral by 2060 opens up extensive business opportunities for green energy and other sustainable technologies, although the Kazakh government is of course also pursuing its own goals.

For example, Kazakhstan could cover 20% of Germany's demand for green hydrogen. The combination of wind and sun is given locally. The larger the export share, the better the financing, which will have to ensure

a large "green" share in the future anyway. However, this presupposes that there are also sufficient buyers of hydrogen in Germany, which is not yet the case today. Apart from that, there is also the important logistical issue: How can the hydrogen produced be delivered cost-effectively from Kazakhstan to Europe/Germany?

There are currently 16 projects in the petrochemical industry and 12 projects in the pharmaceutical industry in Kazakhstan. Improving the health care of the population in particular is a declared goal.

Numerous hospitals and sanatoriums are to be modernized and expanded, creating business opportunities for high-quality medical equipment and drugs of all kinds.

Most investors (e.g. Linde AG, SIEMENS, ThyssenKrupp, CLAAS) believe that Kazakhstan has a very good economic and investment climate.

Kazakhstan, the land of great opportunities, is creating investment incentives for this purpose and wooing international investors with the following measures, for example:

- Tax breaks
- Special economic zones
- Since 2015, a 10-year exemption of investors from property and corporate income tax and 8 years from property tax takes effect
- After successful commissioning of the investment project, there is a refund of 30% of the total investment amount
- Tax rates, levies and fees (except for value-added tax and excise tax) are frozen for 10 years from the date of conclusion of the contract
- For the implementation period of the investment project and for 1 year after successful commissioning, foreign workers can be employed quota and permit free.

It should be worthwhile to invest in Kazakhstan. The Kazakh government attaches great importance to mutual and beneficial cooperation, especially with Germany. However, if one compares the shares of direct investment in the period 2005 to 2021, the Netherlands is the frontrunner with 105 billion US dollars, while Germany invested 5.2 billion US dollars. This should be an incentive for German plant manufacturers.

EDUCATION IS EVERYTHING!

Education and vocational training are among Kazakhstan's strategic development tasks. Great efforts are being made with state reforms and well thought-out education programs to prepare for future challenges.

In close cooperation with the business community, a system of technical and vocational education was established as a dual education by means of theory and practice. For example, an evaluation system for ed-

ucational achievements was created that meets national and international standards. Critical thinking and the ability to search for information independently, IT competence, financial and economic knowledge, and also general education are the focus.

According to international assessments, Kazakhstan is moving in the right direction in developing its educational aspirations. Kazakhstan greatly values education and voca-

tional training as a resource for preparing its young generation for the future.

Children and young people play a special role in this, in line with the Kazakh proverb: "We get everything new from young people."

The interest of the German economy in Kazakhstan is enormous. A real perspective for our plant manufacturers!

ALPHA IN KAZAKHSTAN

Our company ALPHA has been active in Kazakhstan since 2009. While in the first years mainly projects around quality and certification were successfully carried out, the portfolio has been constantly growing since 2015: Added to this were consulting contracts for the safety of complete industrial plants - mainly in the petrochemical and metallurgical sectors, pre-inspections to ensure the quality

of goods before transport to Kazakhstan, project developments in the mining sector as well as greenfield projects with European and American plant manufacturers. Here ALPHA often performed accompanying engineering services, e.g., technology transfer or parts of the project management. Especially in the new political conditions, Kazakhstan's role has grown once again. Some

important European companies perceive Kazakhstan as a stable anchor for business in Central Asia and beyond. In addition, there is the general focus of Kazakhstan's economic policy, be it CO2 footprint or digitalization, all these important topics that ALPHA has already worked on in Europe or Asia as well. It is clear that we see the future in Kazakhstan very positively.

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15 YEARS OF CERTIFICATION, PERMITTING, REGULATORY COMPLIANCE AND INDUSTRIAL PERFORMANCE FOR UZBEKISTAN

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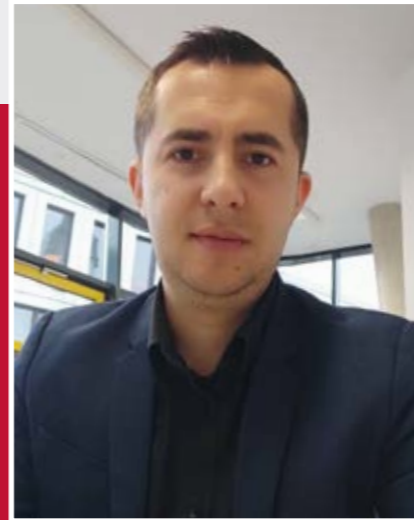
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NORBERT GIES

Norbert Gies joined ALPHA GmbH in March 2022 as Sales Manager for small and medium-sized manufacturers for the markets of the EAWU and Asia. After his military studies from 1982 to 1986 in Moscow and a university degree in economics and last assignment as a public officer in the German Armed Forces, he has been working in the operational area of the logistics companies DACHSER, BAHNTRANS/ABX and Kraftverkehr NAGEL since 1992. He gained specific experience as a project manager in the certification, delivery, assembly and commissioning of chemical, pharmaceutical and food plants from 2007 to 2022, among others, at the company Glatt Ingenieurtechnik GmbH in Weimar.

INTERVIEW WITH IGOR ROMAN

FROM MOLDOVA
TO CHEMNITZ

After completing his studies in banking and finance and obtaining a master's degree in economics, I worked in banking for 8 years, especially in the field of compliance. After moving to Germany in 2018, Mr. Roman started learning German and in 2020 he started working at Alpha Consulting GmbH as a project assistant. Currently, he is responsible for the Compliance - Sanctions area at Alpha and assists the Accounting Manager. At the same time, he is involved in the ALPHA project group for the development of the company's OT/IT products ERDA (certification database) and Cybersecurity solutions for critical infrastructure.

Igor, you come from a country that is known to us in Western Europe mainly for its tasty wine and wooden churches. Otherwise, many Western Europeans know little about your home country. As a Western European, what do you absolutely have to know about Moldova?

Western Europeans should definitely know that Moldova has more to offer than just delicious wine and impressive wooden churches. Our homeland is characterized by warm hospitality, rich culture and history, and breathtaking natural scenery.

From the picturesque vineyards to the majestic river gorges of the Dnister, there is much to discover here. In addition, Moldova is actively seeking closer integration into the European community. We invite you to explore our wonderful country and be enchanted by its diversity.

That sounds very exciting and is almost an invitation for more tourists to your country of birth.

As a student and later as a PhD Student, I wandered several times alone through your linguistically and culturally closely related neighboring country Romania, especially in Transylvania and through the Banat, and always found the special mixture between village culture, religion and breathtaking landscape fascinating. As an "uninitiated Western European", I imagine it to be similar with you in Moldova.

But we are not making a travel guide here for tourists who want to experience something. Tell us something about yourself. Where did you grow up, what did you study?

I was born in Orhei city, the center of Moldova. A fascinating city with rich culture and history. I graduated in Finance and Banking in Chisinau and obtained a master's degree in finance, Investments and Banking. I then worked for 8 years at the largest bank in Moldova.

But now you have been in the Saxon industrial metropolis of Chemnitz since 2018. Why?

Yes, a good question. We have been a family resident in Chemnitz since 2018. We had been planning our move to Germany for some time, as we were looking for new career and life perspectives. Why Chemnitz? A friend who also lives here recommended it to me. The main argument was a very green, quiet and compact city.

Please describe what you currently do for ALPHA. Our audience wants to understand what exactly you do.

As part of my job at Alpha, I am responsible for the area of sanctions and, in part, accounting. With regard to sanctions, I have the task of using certain filters to check whether exporting companies and their activities are affected by sanctions. We create our own sanctions databases based on European guidelines. As far as accounting is concerned, I can say that I offer support and contribute my knowledge acquired in Moldova.

You are also involved in the product development taskforce for our two own ALPHA products in the OT/IT area. Tell us about the project and the two new products!

This project is not only new for me, but also for the company. It is an ambitious and extremely interesting project. Within the framework of the project, we aim to develop IT products in the field of cybersecurity and certificate databases. Here I would like to emphasize that the software we are developing is unique and will be tailored individually to each partner. What makes it unique? The uniqueness of the ERDA database is based on the analysis and expertise of our certification engineers.

Exciting. What is the benefit of the users? I mean, databases exist like good wine and exciting folk music in Moldova, don't they?

Yes, there are many databases, but they may not be as successful as the quality of Moldovan wines and music. What we set out to do is to develop a unique database that meets the requirements of our partners. This goal can only be achieved by the expertise and experience of our engineers in our company. Our customers and partners will thus have fast and up-to-date access to information about the status of confirmation certificates. In other words, we digitize certain processes of our partners.

Saxons do have a "special" way, even if, frankly, that is often just stories from the outside. Sure, the dialect takes more than getting used to. Do you understand the Saxon dialect?

I have been living in Chemnitz for five years and in the city I have not yet got used to it, on the other hand I hear this abroad, I feel home.

What do you like about Chemnitz and what could be improved?

In Chemnitz, I like the green surroundings, the cultural offerings and the compact city center. I see potential for improvement possibly in the infrastructure, economic development and the promotion of integration and diversity.

Thank you Igor, for the open conversation. In any case, a visit to Moldova is on my agenda for the next few years. I would like to be surprised once again. But above all, I wish you success with the new ALPHA products, which fill a gap in the market that has existed like this for a long time.

Dr. Thomas Krause & Igor Roman

ALPHA
THINK QUALITY

Member States of the Gulf Cooperation Council and North Africa

We have won a project there and deliver our machines or even a whole plant! **Fantastic!**
 We have to comply with the regional technical regulations and certify our equipment! **Absolutely!**
 We are reaching our limits! **ALPHA will definitely help us! Sure!**
 We contact **info@alpha-consulting.eu**

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WELCOME TO ERDA !

CUSTOMIZED MANAGED SERVER DATABASE - BASED ON AI-FEATURES



Discover how ERDA can help you increase your efficiency in technical regulation and certification throughout the lifecycle of your products or assets, or even in the supply chain for plant construction projects.

ERDA - the reliable database for global certification, technical regulation, and approvals. It is the optimal solution to help you make data-driven decisions and forecasts and differentiate yourself from the competition. Simplified processes, increased transparency and agility, and clear systematics help you internally manage regulatory processes worldwide and create a competitive advantage for you. Benefit from ALPHA's know-how since 1998.

ERDA - a solution for manufacturers of a wide range of components, equipment manufacturers and operators of production facilities.

In the age of the Internet of Things, the data economy and the increasing relevance of data-based decisions, database systems also play an important role in technical compliance. In addition to the right questions, suitable tools for their evaluation and, finally, a sound expertise in their interpretation and the derivations to be made from them, data and working with them first of all require a suitable storage and administration location. This is where ERDA comes into play.

COMPOSABLE IT

Due to flexible but often limited resource pools, databases must become more dynamic and agile in the future. ERDA has the important task as a hosted system of providing the best possible support for the virtual and container-based workloads of a corresponding agile IT infrastructure in the quality management system or in the supply chain.

MICROSERVICES AT SCALE

ERDA offers some tangible benefits, for example, by making services or parts of them automatable. Thus, all data on certifications and the status of new applications broken down to your components and sub-components including country maps can be clearly adapted and scaled up to ensure efficient and practical use

PROGRESSIVE WEB APPLICATION

ERDA ensures smooth interaction within your company, with customers and partners, and as a database can store information offline on end devices and then synchronize it automatically online.

HOSTED SERVER RELATIONS

The more important information technologies become for business decisions, the greater the influence of hosting by ALPHA engineers on product development and marketing concepts. For example, our experts contribute valuable information to your certification scope within the framework of certification teams and thus promote its best possible use in your company.

KNOWLEDGE TRANSFER

Not every company has the capacity to provide the right expert opinions on individual target regions. ALPHA engineers manage your components and technical compliance in the background. Practically a combination of ALPHA's excellent engineering best practice since 1998 and automation to keep you on the right side globally.

AGILE WORKING IN A DIGITAL WORKING ENVIRONMENT

During digitalization, the existing supply chain is modernized. This is where ERDA is strong, as our system helps you bring together all information about certifications, technical regulation, and approvals in one place. Agile systems need to offer fast response times. ERDA's networked system enables industry players to work in an agile way, because everyone is informed about every step.

A EUROPEAN SOLUTION

In the wake of data fraud and attacks from digital infrastructure plays, it is important to place your trust in a provider that offers a solution from Europe. ERDA - copyright ALPHA - is a German product. Hosting is done from Germany - in strict compliance with the current security and database standards of the European Union.

ALPHA
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TOO MUCH INFORMATION ON INCREASINGLY COMPLEX CERTIFICATION REQUIREMENTS?

Things are going to be fine. We can do it!

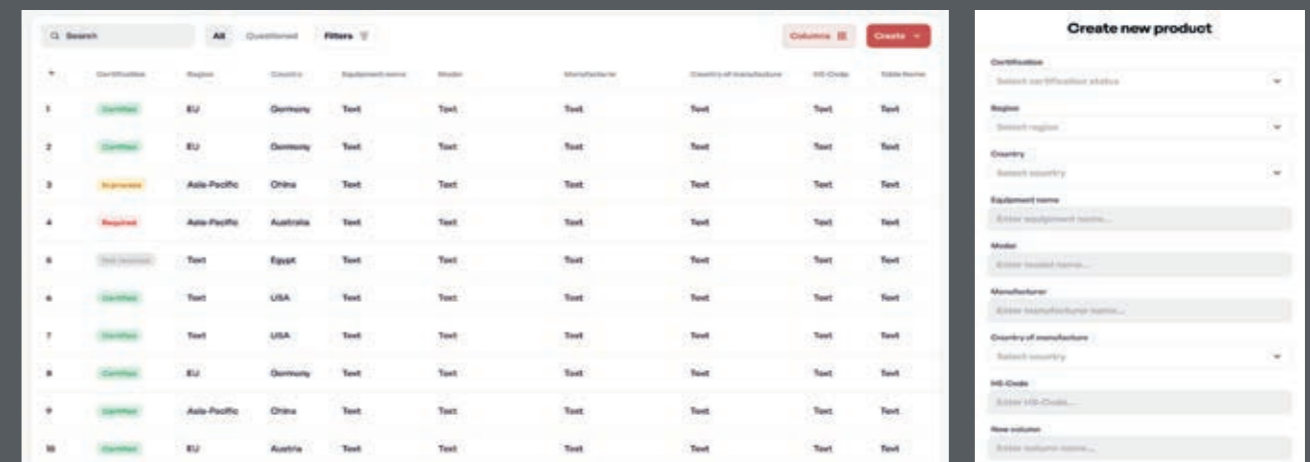
With ERDA © by ALPHA - the innovative AI tool for your global certifications and registrations with 07/24 backup service for your team and sales department.

Scrap the old dusty file folders. Dare to make it all good.



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Your new customized managed server database for all who want to organize, systematize, and manage the international conformity and certification of their products and equipment.

Right for manufacturers of large product ranges, operators of plants and engineering companies in the supply chain.



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