

The deugro Service Portfolio

Power Industry





Specialized Supplier



Family Enterprise Since 1924



Global Access 40+ Countries 70+ Offices



Trusted Partner



In-house Chartering Team

deugro's Power Expertise at a Glance

The power industry has been a key market for deugro since the very beginnings of the company in 1924. Thanks to our global team of logistics and technical experts, we have experience working on complex power projects on every continent. It's this experience that makes deugro a leader in its field of business, assessing risk and delivering value-added logistics solutions for the safe transportation and installation of components for global power projects.

deugro recognizes that the power industry has evolved significantly over the last decade, with a drive to develop technologies for lower carbon emissions and power sourced from renewable energy. It's important not to lose sight of the many opportunities available to us, be it in the development of the existing transmission/distribution infrastructure or in the breakthrough in renewable energy supply technology. deugro's aim is to have a balanced portfolio in terms of renewable and traditional power generation, as well as a diverse global base of clients who are focused on newbuilds, expansion and the strategic service and replacement of assets. This enables us as an industry to embrace change, adapting and supporting our clients as the market develops.

We have collaborated with all the major power generation manufacturers to design and develop innovative logistics and supply chain solutions.



Furthermore our aim is to reduce risk, provide accurate scheduling and reduce the cost of logistics delivery for high-value and critical equipment. These solutions cover gas turbines, generators and transformers, offshore wind turbines and hydro-electric equipment. From ocean shipping and barging to road and rail transportation and installation at the job site—we have the experience and capability to manage all aspects of the logistics supply chain.

deugro's end-to-end supply chain management provides the assurance needed for modern power projects. We cover front-end planning, identify infrastructure and permit limitations, and work with all necessary stakeholders to ensure logistics delivery is on schedule, on budget and includes the highest level of health, safety and environmental control.



Marchwood Project: Positioning of gas turbine using a hydraulic lift and lock system

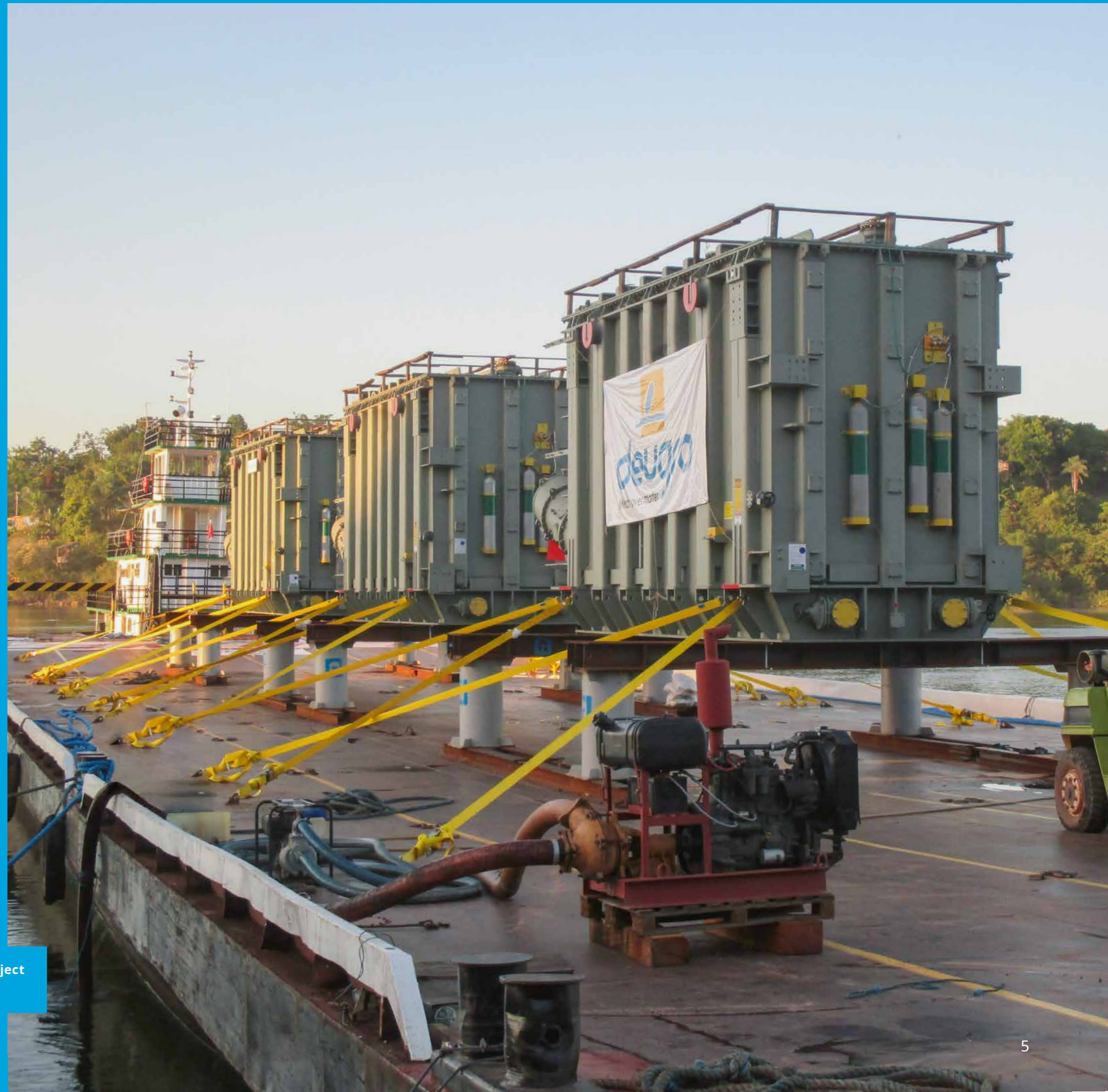
Our Power Industry Services

deugro's early involvement with client stakeholders is key to delivering customized consultancy services, precise project planning and full-service project forwarding solutions.

Our services are tailor-made for power manufacturers, EPCs and investors:

- Budgeting
- Road and rail permits
- Project schedule planning
- Flexible execution methods
- Vendor selection
- Site visits
- Risk assessments
- Method statements
- Site installation
- Engineering
- Supervision
- Operational assurance
- Project management plans

**Belo Monte HVDC Project
(phase one) in Brazil**



QHSES – Safety First!

Client satisfaction is the motivation behind all our efforts. It is our conviction that this can only be successfully accomplished if we are good custodians of the trust granted to us by our clients, their goods and the surrounding environments. All companies of the deugro group are guided by this fundamental principle. We aim to continuously achieve the deugro group's objectives and vision, leading by example and setting the standard for quality, health, safety, environment and security (QHSES) in our industry.

For deugro—a company of the deugro group—we have developed an Integrated Management System (IMS), and are ISO-certified (ISO 9001:2015, ISO 14001:2015 and BS OHSAS 18001:2007) by DQS GmbH. This system is continuously reviewed and improved to enable us to meet our objectives in the future, too.

At deugro, we integrate QHSES in every phase of your project—from the very beginning of the concept to the design and all the way through to execution. Because every project is a unique undertaking, our approach is planned on a case-by-case basis, pursuant to the most stringent HSE standards. Before the implementation of the execution phase, we develop the project-specific HSE plan, taking into

account all site-specific conditions and covering every aspect of the scope of work.

This project-specific plan focuses on implementing detailed risk management for the project to ensure that all risks identified and assessed are reduced to as low as reasonably practicable (ALARP). This is completed by identifying possible hazards that all project stakeholders may be exposed to, and by making sure that all mitigating controls are identified and properly implemented. During the execution of the project, our QHSES set-up ensures that all operational and HSE key performance indicators (KPIs) that were agreed to are closely monitored and acted upon to ensure that performance continually improves.

Should there be any incidents or occurrences of non-conformance, QHSES and the respective operational team work closely together to investigate and devise the appropriate corrective action.

Our activities are planned, organized and performed in a safe and environmentally-friendly manner. We are dedicated to maintaining the environment in which we work and to providing a safe, secure and healthy workplace for our staff and all parties involved in every project we handle. Our reputable and competent business partners and subcontractors are vetted by the QHSES team based on their equally high commitment.

We are committed to a culture where health and safety are not compromised!



deugro minds. Safety matters.

Our Compliance Standards

The deugro group compliance standards are reflected in various ways, and it is our philosophy to incorporate compliance at all levels of the group and in everything we do. Our corporate policies—the Code of Ethics and Compliance (CoEC) and the Anti-Corruption Compliance Policy (ACCP)—are proof of our commitment. These corporate regulations are mandatory for all deugro group companies worldwide, and employees and business partners are required to operate within their framework at all times. Our Compliance Management System (CMS) was designed to consider various international regulations and recognized standards, including the United

States Foreign Corrupt Practices Act (FCPA), the UK Bribery Act 2010 (UKBA) and the OECD Guidelines for Multinational Enterprises. The CoEC and ACCP serve as the foundation for the CMS, and are reviewed, updated and acknowledged by all deugro group employees on a regular basis.

Furthermore, our Transport Management System (TMS) screens all shipments, specifically the names and addresses provided, on a 24/7 basis against all applicable international governmental sanction lists in order to scrutinize each business transaction.

To keep our employees involved in our efforts to live and maintain

the highest standards of ethics and integrity, we also offer frequent compliance training. It is provided online and in face-to-face workshops, subject to individual risk assessments. Important announcements on the corporate intranet and local bulletin boards serve to raise ongoing awareness.

Local compliance ombudsmen are available in all of our offices. All compliance ombudsmen receive face-to-face training by the Head of Global Legal and Compliance.

Our approach to your project



Plan
Specific risk assessment, QHSES plans



Do
Job safety analysis, method statement, subcontractor vetting, training



Check
Auditing, workplace inspection, certifications



Act
Management review, preventative and corrective actions

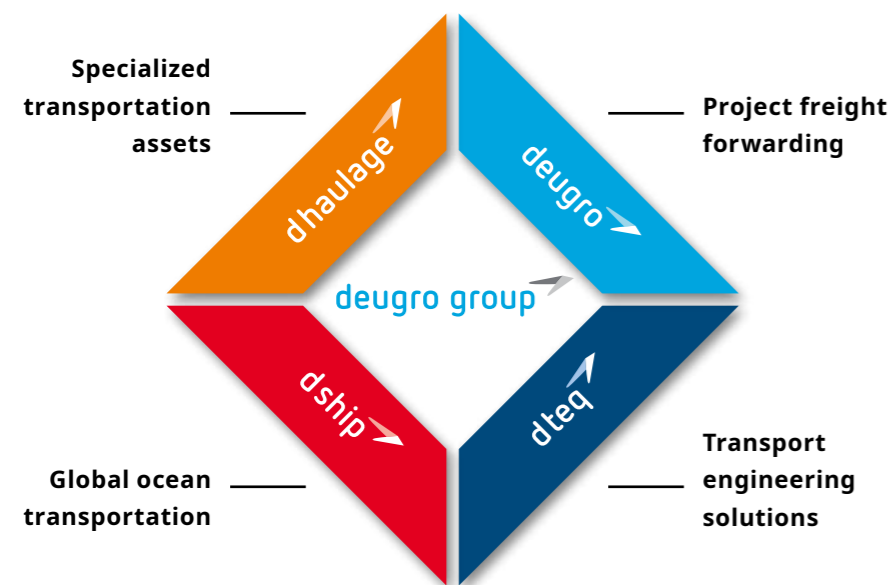
» A successful compliance program is not about focusing on the rules. It is about fostering a true culture of ethics and integrity. «

Jessica Kaplan, Head of Global Legal and Compliance

deugro group: The Unique One-stop Shop

The deugro group originates from deugro, the first company founded in 1924 in Frankfurt am Main, Germany. Today, the deugro group continues to be a family-owned enterprise with a strong financial foundation. This global, flexible and diversified network with local knowledge and experience is redefining industry standards now more than ever.

The deugro group is comprised of four independent companies that offer far-reaching competence, experience and know-how in their fields of business:



deugro

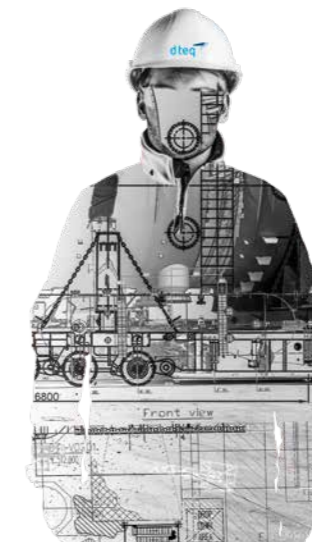
deugro is a highly specialized freight forwarder with a strong focus on turnkey logistics solutions for industrial projects. It has a proven track record in successfully executing projects of any magnitude, even under the most challenging conditions and requirements. deugro focuses wholly on identifying and solving clients' specific needs with unique tailor-made solutions to fulfill all requirements. To deliver the best in both cost and performance, deugro serves as an extension of its clients in their respective supply chains. It provides ocean and inland waterway freight services, road and rail transportation as well as air freight to almost any destination.

» We are redefining industry standards now more than ever. « Thomas C. Press, CEO – deugro group



dhaulage

dhaulage provides an extensive and comprehensive range of heavy haul and heavy lift equipment for any kind of specialized or challenging project. The company owns and operates its own fleet of prime movers, heavy duty hydraulic trailers as well as other specialized conventional trailers, and installation equipment, which are available to our clients at any location worldwide. Furthermore, dhaulage owns a variety of supporting equipment, such as fenders, lifting equipment of various capacities, lighting towers, generators and a tailor-made fly-over bridge with a capacity of 300 metric tons.



dteq

dteq Transport Engineering Solutions provides tailor-made transport and marine engineering solutions, as well as port captain, surveying and supervision services, and project consulting. To solve and overcome all the challenges of moving oversized and heavy cargo, dteq's experts leverage decades of specialized engineering knowledge and experience. They do so with dedication, talent and an inventive spirit for every project phase.



dship

dship Carriers provides cost-effective tramp services for heavy lift and project cargo. Driven by service, dedication and high-quality workmanship, dship ensures that risk remains at a minimum and delivers solutions that exceed clients' expectations. A global provider of ocean transportation services, dship manages and owns a fleet of modern and reliable multi-purpose vessels. These are designed to support the specialized needs of breakbulk, heavy lift, dry bulk and project cargo clients in the oil and gas, wind energy and floating cargo industries—to name just a few.

KIPP Kirikkale Project: Loading from the barge by geared vessel in Rotterdam, the Netherlands

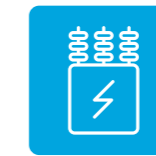
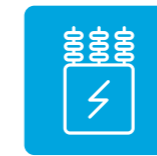


Our Verticals for the Power Industry

deugro offers extensive knowledge in managing highly complex and demanding newbuilding projects on a global scale. We offer bespoke technical solutions to overcome every challenge, from aging infrastructure and routing feasibility to constrained site access and minimal to no site laydown area.

Critical and time-sensitive project deliverables provide an opportunity for deugro to showcase its customized, reliable solutions. They ensure that downtimes are minimized and projects are within budget through commercial engineering, such as by bundling purchase models—on time, on budget and safely delivered.

We can provide in-depth support during the full project life cycle. Our experience and expertise cover the following power segments, to name just a few:



Generation

Non-renewable

- Thermal power generation
- Nuclear and steam power generation
- Combined cycle power plant

Renewable

- Waste to energy power generation
- Hydroelectric power generation
- Wind power generation (offshore and onshore)
- Solar power generation (photovoltaic and thermal)
- Geothermal power generation

Transmission

- Transformers
- Substations
- HVDC links

Distribution

- Grid energy storage
- Transformers
- Batteries

Point of View:

A Paradigm Shift within the Power Segment

Meet Andreas Menzel, the dedicated expert within deugro for the power industry. Contributing broad industry experience, he is working on the alignment of the power industry across all deugro businesses globally and sharing his know-how. Read in this interview how deugro set up its structure to support clients in managing a shift towards renewable energy supply.



Andreas Menzel,
Corporate Global Key
Account Manager

How long have you been working now for the power industry, and what is your personal commitment to it?

I have been working in the logistics industry since 2004, and have handled power projects and cargo since then. I started in the maritime sector and focused on the shipping of cargo related to the power industry. I was in different operational and technical positions and gained first-hand experience in cargo security and quality, as well as in safety, in the Port of Bremerhaven. Ever since 2012, I have been dedicated to the entire transportation chain and have worked intensively on numerous projects for the power industry worldwide. In my current role, I am responsible for developing deugro within the power industry.

Which means that I focus on increasing sales efforts, identifying and monitoring industry trends and getting deugro involved in major power projects globally. Working directly and closely with our clients is another aspect of my work. This also includes that we as deugro are always setting industry standards in this segment and fulfilling our clients' needs 100 percent.

Based on your project experience, where do you see the deugro difference we are able to offer our clients?

By having such an extensive depth of knowledge, skill and experience globally, we are able to support every stage of the project—from providing comprehensive feasibility studies at the feed stage to achieving operational excellence following the awarding of the project. In addition to this, we can offer the unique structure of the deugro group, which is comprised of several companies focusing on project freight forwarding, ocean transportation of heavy lift and project cargo, transport and marine engineering as well as specialized transportation assets. This enables us to provide front-end feasibility in order to mitigate operational risk and reduce supply chain costs.

Innovation and adaptation is the key to not only growth, but also to maintaining our current market position within this challenging climate. Therefore, deugro continues to invest in this philosophy and, as a result, prospers. Investments such as new and innovative IT solutions are a great example of this, and another would be the purchasing of own

haulage and handling equipment in developing regions within the deugro group. By making these considerable investments in the power segment, we are able to support our clients independently without being reliant on third parties whose standards do not measure up to our own or those of our power clients.

From your point of view, how is deugro preparing to offer value-added logistical solutions to the growing power industry in the future?

Having observed the paradigm shift within the power industry, deugro has already adjusted and must continue to do so in order to suit the needs of manufacturers and project owners.

We recognize that the demand for cleaner energy production, renewable fuel sources, technology experience and government funding on a global scale is forcing our clients to quickly adapt; and as a logistics provider, we must follow this trend. We see how the power industry is shifting in different directions globally. Where some countries decided not to support coal-fired power plants and nuclear power plants in the future, other countries must count on these relatively cheap power production facilities. This means that our knowledge in the different power industry sectors must shift to the relevant countries. We are following

» Our job starts where others don't even start to think about it. «

Andreas Menzel, Corporate Global Key Account Manager

this shift by extensively sharing knowledge about specific client requirements and cargo-specific handling experiences. This is a major step and is fully supported by the deugro Global Key Account Management team and our vertical strategy to support our clients and the specific industry. We can therefore offer comprehensive solutions and concepts well before the projects are funded. Our job starts where others don't even start to think about it.



188 MT transformer on its way to a substation in Texas, USA



Project Insight:

Musandam IPP, P/140511

Wärtsilä Muscat LLC appointed deugro Projects (India) Pvt. Ltd. as the logistics partner to undertake the transportation of 15 gensets and five transformers from various origins in Europe and India to the Sultanate of Oman.

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Project Data

- Power vertical: Generation
- Client: Wärtsilä Muscat LLC
- Project owner: Musandam Power Company
- Total volume: 20,000 FRT
- Max. heavy lift: 150 MT
- Cargo details: 15 gensets (150 MT each) and 5 transformers (70 MT each)
- Origins: Finland, Poland, Belgium, India
- Project location: Tibat, Wilayat of Bukha (Sultanate of Oman)

During the entire shipment, deugro offered services such as booking and chartering of suitable vessels; supporting port operation activities, including customs clearance; and loading, securing, discharge and transfer of the cargo to specially acquired areas for immediate storage at the Port of Mina Saqr. After leaving the port, deugro arranged the road transportation to the job site, including the improvement and reinforcement of public roads and bridges or any other required civil works like lifting and/or shutting down of electrical cables, and arranged for the required permits from the relevant authorities.

Throughout execution, a team of engineers from dteq Transport

Engineering Solutions (dteq) leveraged their in-depth knowledge to limit the exposure of risk in the planning and execution of transports.

deugro successfully completed the project, with all 15 units of the engine set and five units of transformers duly positioned on their respective foundations. All heavy lift (HL) units were positioned using jacking and skidding due to the lack of space for the high-capacity crane.

All the containers (general purpose, flat rack, high cube and open top), including all types of inventory, were safely delivered and offloaded at the on-site storage yard

according to Wärtsilä’s material management requirement for the project.

The entire movement and work awarded to deugro was completed in 17 months, in line with the project’s schedule, without any delays or incidents.

Challenges and solutions during project execution

Remote job site / poor infrastructure

The only available deep-sea port for transporting HL units is the Port of Khasab, which is a natural port but with very limited connectivity to the actual remote job site via a single road with poor infrastructure and hilly terrain. Due to the contract’s stringent health, safety and environment (HSE) requirements, road transportation along the treacherous route was to be avoided. After detailed route surveys and port studies, deugro suggested the Port of Mina Saqr, located approximately 17 kilometers from the project site, across the border in UAE. For container shipments, the Port of Jebel Ali was finalized.

Omanization

As a contractual requirement, the client requested for the shipments to be imported through the ports in Oman and to use a PR/clearing agent registered in Oman. deugro engaged a subcontractor based in Muscat for the supply of the crane and forklift. The vendors were duly inducted and approved by the client to fulfill the project requirements.

Even though the ports selected for discharge are in the UAE, deugro suggested to complete all the import formalities under

the Statistical Import Clearance Procedure, a mutual commercial pact among Gulf Cooperation Council (GCC) countries. deugro also suggested to clear the shipment through duty payment, rather than clearing under security bond, to avoid any post clearance documentation issues.

Equipment support

As part of the initial request, deugro was asked to undertake the offloading of the containers on site. Keeping the project schedule in mind, deugro arranged for the deployment of a dedicated crane with 50-metric-ton capacity, along with the support crew on site with a O1-certified rigger. In addition, deugro arranged a forklift with 5-metric-ton capacity to assist the client in handling any shifting activity of packages during the offloading and as supportive equipment during the installation of the engines and transformers at the site.

- Traffic management for vehicles at the offloading/laydown area
- Minimizing the turnaround time of trailers during offloading
- Managing the storage of the Shipper Owned Containers and loose material, and proper demarcation and arrangement of them in a planned sequence
- Recordkeeping for and updating of the storage plan of the laydown area with each and every delivery



Engine set offloaded at the site near the foundation for final positioning

Storage management

Throughout the project, several bottlenecks were experienced for the storage of SOCs/material at the site, such as traffic management and the shortage of storage space for the SOCs. As a result, deugro assisted the project team in:

Project Insight:

Duke Citrus Project

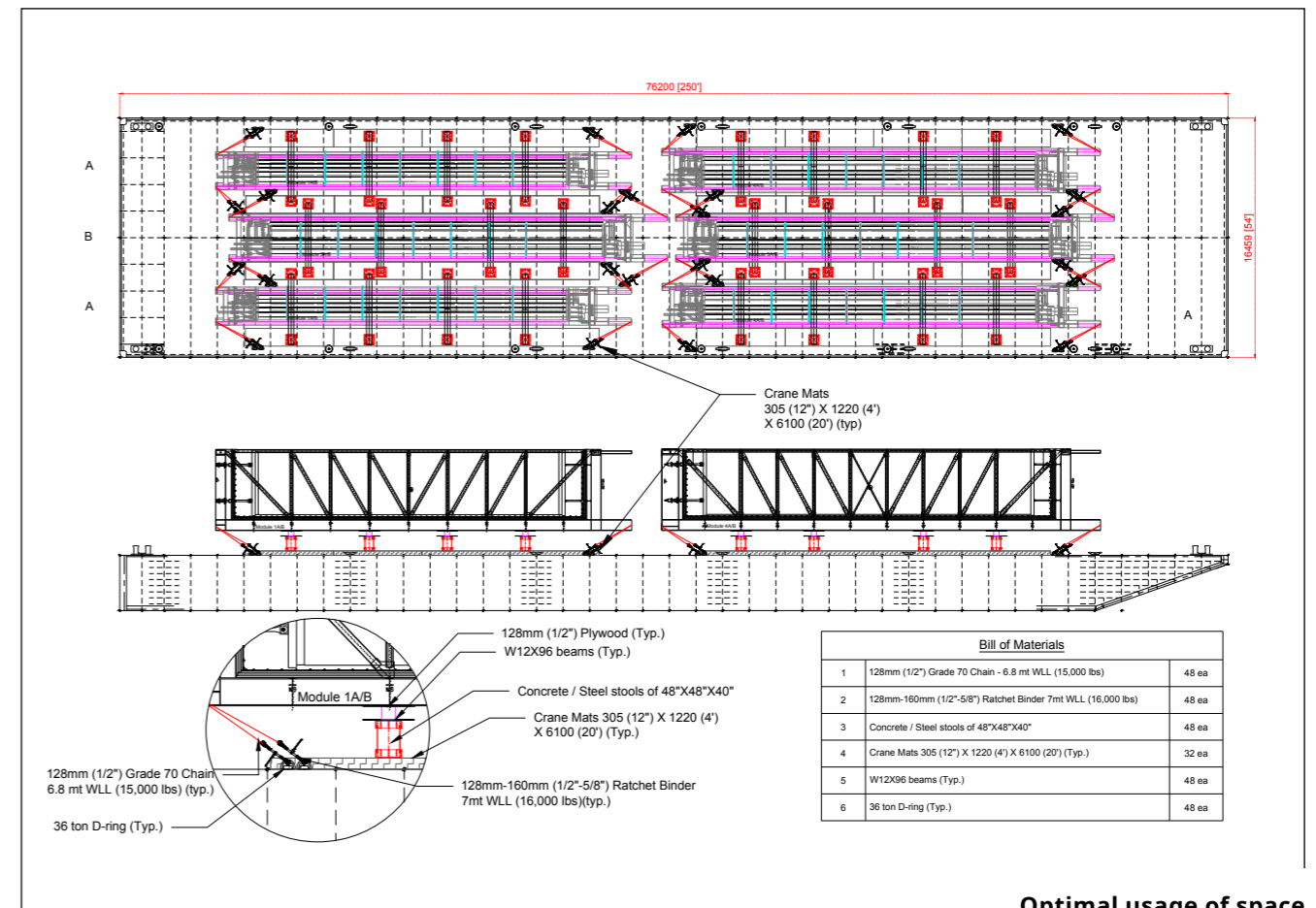
The Duke Citrus Project is one of the largest combined-cycle natural gas plant projects in the industry. Once completed, the 1,640-megawatt plant, located in Citrus County, Florida, USA, will deliver cleaner energy with higher efficiency for the region.



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Project Data

- Power vertical: Generation
- Client: Vogt Power
- Location: Crystal River, USA
- Scope: Barge transportation
- Cargo: 44 HRSG modules, high-pressure drums
- Cargo details: 22,000 FRT with heavy lifts up to 350 MT



Optimal usage of space available on barge thanks to shifted cargo arrangement

Vogt Power awarded deugro the transportation tender for four units of Heat Recovery Steam Generators (HRSGs) for this power plant. Each of the four units included ten modules and two large high-pressure drums.

the barges on stools and beams in line with the securement plan, likewise engineered by dteq. Afterwards, deugro coordinated the tow of the barges to the power plant site and managed the roll-off delivery to the plant.

Project scope

deugro took two large-deck barges, certified by the American Bureau of Shipping (ABS), on a four-month bare charter. We arranged and coordinated the towing of these barges from New Orleans to the port in Manatee, Florida, for loading. At the port, deugro set up and performed the layout of the stools and beams for the barges according to the barge stow plans engineered by dteq Transport Engineering Solutions (dteq). Once loaded, the units were secured to

Challenges

- Complex barge stowing concept
- Shifted stowing due to cargo dimensions and little space available on deck
- Precise coordination with the United States Coast Guard on delivery schedules due to the narrow and very busy coal barge navigation on the private channel
- The largely varying tide required the use of a mooring barge to distance the cargo barge from the shore and rocks.



Project Insight:

Belo Monte HVDC Project

When finally up and running, Belo Monte will be the third-largest dam in the world. It will be the main Brazilian hydroelectric plant, generating more than 11,000 megawatts of power at full capacity. The power generated will be transmitted over a 2,000-kilometer-long transmission line, able to provide sustainable energy for 17 entire Brazilian states and hence 60 million people. This amount of energy would replace the output of about eight nuclear power plants.



Challenges

- Difficult and complex Brazilian terrain
- Roads affected by transformer size
- Significant tide changes, winds, currents and busy ferry traffic on the Amazon River
- Steep 14% incline at discharge in Xingu
- Extremely long transportation routes spanning half the Earth's circumference

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Project Data

- Power vertical: Transmission
- Cargo: 28 transformers (14x 400 kV, 219 MT each; 14x 800 kV, 332 MT each)
- Max. dimensions: 1,070 x 480 x 510 cm
- Origins: Germany, China and Brazil
- Places of delivery: Vitória do Xingu (Belo Monte job site) and Estreito (substation), Brazil
- Volume: 68,343 FRT

The transformers had been shipped by heavy lift vessels to the ports of delivery in Santos and Belém, where parts of the cargo were transshipped on locally sourced deck barges with special grillages. This allowed the self-propelled modular trailer (SPMT) to enter underneath the transformer at the final discharge location in Xingu, Pará for further transportation. The other part of the cargo was transported by road with specialized heavy haulage equipment.

After a five-day voyage through the Bay of Guajara, Marajo, Pará River, Straight of Breves, and Amazonas River, before finally heading into the Xingu River, the deck barge arrived at the discharge location at Xingu, where a custom-made mobile jetty was waiting to discharge the valuable cargo. This jetty had been constructed in cooperation

with a subcontractor especially for this project, in order to be able to adjust to the local tide variations. In addition, using the custom jetty allowed the team to minimize community impact and to avoid disruption of the vital ferry service of the Trans-Amazonian Highway.

The discharge at Xingu was one of the major challenges of the project and had to be planned and executed carefully in cooperation with a team of engineers from dteq Transport Engineering Solutions (dteq), a company of the deugro group. While docking, the barge had very few contact areas available and specific mooring points had to be built. Once the barge was safely placed for the roll-off operation, the cargo needed to overcome a 14-percent incline on the gravel path of the Xingu riverbed. The solution to secure this crucial move was a special surface on the

jetty to prevent a slide backwards. The whole jetty was fixed on steel beams built into the ground. This precise move was only effective due to great teamwork of all project parties involved.

From here on, deugro successfully managed the transportation via SPMT to the final job site, the HVDC converter station in Xingu. This station is able to receive energy from the Belo Monte complex and convert it into alternating current in order to transport the energy to the town of Estreito, which is 2,000 kilometers away.

At the same time in Estreito, multiple axle line trailer and girder bridge units delivered the remaining transformers. The sheer size of each transformer meant that roads would be affected. In cooperation with the local authorities, deugro minded all

» This precise move was only effective due to great teamwork of all project parties involved. «

weight limits and other regulations. Various measurements were taken, such as allowing the roads to “breathe” between each massive cargo move or bridge inspections after each load.

One particular road section was so uneven that it required the height of the hanging cargo on the girder bridge to be raised. The cargo would otherwise have been hung up on the hilly parts of this challenging route.

In addition to the power distribution part of this project,

deugro transported equipment designated for the power generation plant at the Belo Monte job site as well. Fourteen transformers weighing up to 218 metric tons each, six transformers of up to 265 metric tons in weight, rotors and turbine shafts were shipped from their factories from various origins in Brazil to Vitória do Xingu. The scope not only included transportation by road and ocean, but also discharge and storage.

Project Insight:

Inalum Boost Project

A major client in Indonesia awarded deugro (Singapore) Pte Ltd an air freight charter from Europe to Indonesia that involved a series of challenges and special transportation pre-arrangements.

The shipment consisted of two transformers plus accessories out of Vaasa, Finland and two rectifiers out of Baden, Switzerland. After evaluating various options, deugro proposed to consolidate both shipments in Helsinki and arrange for a combined air charter to Kuala Namu, Indonesia.

Because of the transformers' dimensions (4.9 x 2.5 x 3.3 meters each), deugro needed to use an Antonov AN-124-100 aircraft. The remaining capacity of this open-plan aircraft would transport the 5-metric-ton rectifiers from Switzerland perfectly. During planning and execution, this solution proved to be the most cost-effective for our client.

It was the first time the airport in Medan had received such a large aircraft, so deugro had to make sure that certain preparations were completed in advance. deugro planned and performed several road improvement works so the road leading out of the airport could handle the massive cargo load; the airport then issued the landing permit.



The timeline was challenging. The cargo from Switzerland had to be forwarded during the holiday season. In addition, ground handling agents at both the origin and destination airports were unable to accept charter planes on New Year's Eve. It was only thanks to the full commitment of all of our team members during the holidays that it was possible to complete every step of the project on time.

Finally, the aircraft took off from Finland and headed to Indonesia, where our team was waiting to supervise the discharging operation. With the help of purpose-built ramps and overhead cranes on board the aircraft, the team was able to load and discharge via the front and rear

doors simultaneously. The cargo was moved out of the cargo hold and onto a ramp via a trolley system, from where a mobile crane lifted the cargo to transfer it. The truck on the ground at the airport was ready to deliver the cargo to the construction site in Medan on time and to the full satisfaction of our client.

Challenges

- Ground-leveling works at the airport in Kuala Namu in order to receive the heavy cargo
- Tight time schedule during the holiday season
- Loading under turbulent weather conditions



Lifting of a transformer during offloading operations in Medan, Indonesia

Project Insight:

KIPP Kirikkale Independent Power Plant Project

The KIPP Kirikkale Independent Power Plant Project has involved the heaviest transportation over the longest distance ever executed in Turkey to date. Five trips with heavy lifts of up to 405 metric tons posed a few challenges: On each trip, we crossed over 30 bridges, traversed 380 road kilometers and moved a total of 65,000 freight tons.



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Project Data

- Power vertical: Generation
- Client: Samsung C&T
- Scope of work: Offshore and onshore freight forwarding and logistics management solutions
- Heavy cargo: 2 gas turbine generators, 2 gas turbines, 1 steam turbine generator, 2 heat recovery steam generators
- Destination: Kirikkale, Turkey
- Origins: Poland, Netherlands, Portugal

The onshore transportation from the Port of Samsun to the site in Kirikkale, Turkey marked the most challenging part of deugro's scope of work. In order to ensure seamless operations, deugro provided a front-end, port-to-door logistics plan, as well as a detailed route and staging investigation in Turkey. In addition, a complete concept and solution for the movement of heavy haul items weighing more than 400 metric tons was included. This also involved the management of permit issues for heavy haul and oversized cargo.

Due to a lack of suitable equipment and infrastructure in the country,

deugro needed to pay special attention to having the right heavy haul equipment in place for the project. Wherever viable, local vendors and suppliers had been taken into account to save both time and costs. In regards to the infrastructure, deugro faced weak structures on the route around the plant and on bridges. Together with the heavy haul vendor and deugro's engineering team, deugro worked on technical solutions and the suitable upgrades of the poor road infrastructure.

All in all, deugro was able to provide a strong, safe and flexible heavy haul solution for the client.



Gas turbine roll-off using an 18-axle, four-file SPMT over an extended ramp

Project Insight:

Marchwood Power Plant

The project's size and deugro's scope of work were particularly unique because they involved the shipping of the entire Marchwood Power Plant, a 850-megawatt combined cycle gas turbine (CCGT) power station. The transportation involved the movement of all core parts of the station, including 36 heat recovery steam generator (HRSG) modules. This meant a total of more than 55,000 freight tons were successfully moved from South Korea, Indonesia and northern Europe to Marchwood, UK. During the execution of this power generation project, more than 100 people were subcontracted by deugro to work in the ports, on the marshalling yard and on the job site.

Four heavy lift, full-charter vessels from South Korea and two part-charter vessels from Indonesia—loaded with 30,000 freight tons of boiler components—arrived in Southampton and Marchwood. The main challenge was to transport the oversized HRSG modules. deugro had engineering work done in advance to prepare the vessels to ship the unstackable modules. The solution: Intermediate artificial decks in three vessels to hold the heavy modules safely.

However, the HRSG modules could not be discharged in Marchwood because they were too heavy for the quay structure. As a result, the modules had to be moved by

floating crane from Southampton to Marchwood. The operation took 18 days, also due to the short tidal windows in Marchwood in connection with the shallow waters there. After the HRSG modules were delivered to the site, the heavy main components from northern Europe arrived by coaster and heavy lift RO/RO vessels.

All cargo was then taken into intermediate storage on a marshalling yard and delivered upon the client's request to the job site. This meant that cranes, escorts and suitable truck/trailer configurations had to be organized. On site, deugro's scope included the installation of three

transformers by means of jacking and skidding. In addition, deugro was responsible for the lifting and setting of the two gas turbines and two gas turbine generators onto foundation by hydraulic lift and lock system.



Project Insight:

The Largest Power Plant Complex in the Caribbean

deugro (USA), Inc. was contracted to transport all of the equipment and materials needed for two large Flexicycle™ power plants in the Dominican Republic. Although this project presented quite a few challenges for our team, we came up with unique solutions to each one.

After intensive planning, conducting route surveys and feasibility studies, it turned out that the route required modifications, such as rerouting traffic; permanently raising high-voltage power lines, distribution and communication lines and taking down hundreds of illegal lines; as well as reinforcing a bridge along the way.

Due to a lack of suitable transportation equipment available in the Dominican Republic and nearby countries, the decision was made to mobilize a fleet of Goldhofer THP/SL axle lines, prime movers, installation equipment and accessory equipment, owned by dhaulage, a company of the deugro group.

deugro's scope of work included international freight forwarding of equipment and materials from all origins, onshore delivery and installation of 24 300-metric-ton engines, generators and boilers, using our own jacking and sliding



system and locally sourced hydraulic cranes.

As a result of various schedule changes, multiple tasks had to be completed in parallel; consequently, the job site was at times very crowded. During peak construction time, there were over 1,200 workers on site.

In light of the limited laydown area at the project site, deugro operated a 25,000-square-meter marshalling yard just outside of the Port of Caucedo. All cargo, whether breakbulk or containerized, was immediately delivered to the marshalling yard following customs clearance, for subsequent delivery coordination to the project site. This set-up was ideal for overall

project management and control, job site scheduling and deliveries.

On a couple of occasions, we had to reschedule planned transportation and installation work because some sites were inaccessible. These changes had to be closely coordinated and agreed upon between the client's site management and deugro's project

management team, in line with new vessel arrivals and the availability of deugro's transportation equipment and manpower. Efficient and professional cooperation and communication were key to our success.

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Project Data

- Power vertical: Generation
- Client: Wärtsilä Finland OY
- Project volume: over 120,000 FRT
- Cargo highlights: 80 heavy lift items ranging from 60 to 300 MT
- Origins: Italy, Finland, Poland and Japan
- Project location: San Pedro de Macoris, Dominican Republic



Crossing of a fly-over bridge that was installed to protect a culvert

Project Insight:

Maritime Link Project

deugro was awarded the contract by ABB to execute the shipment of transformer units and accessories to remote and icy job sites in Newfoundland and Nova Scotia on the east coast of Canada.

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Project Data

- Power vertical: Transmission
- Cargo: 1 GSU transformer of 200 MT, 6 HVDC transformers of 150 MT each, and accessories
- Total volume: 13,000 FRT
- Max. heavy lift: 200 MT
- Commodity: Power plant equipment
- Client: ABB
- Origins: Sweden, Spain, Germany, Italy and Canada
- Destination: Newfoundland and Nova Scotia, Canada

The transported power equipment forms part of a renewable energy supply link over a distance of about 360 kilometers. Because Newfoundland has an excess of energy thanks to its natural resources, electricity is transported as High Voltage Direct Current (HVDC) to mainland Canada. The supply link shall allow for electricity of up to 500 million Watts to overcome great distances with minimal losses and run in both directions.

The key cargo that deugro transported for this project involved power transformers. Part of deugro’s scope was the lashing and securing of all items for safe ocean transportation. Once the ocean voyage from various worldwide locations arrived at the

discharge ports in Nova Scotia and Newfoundland, the transformers were discharged directly to Goldhofer hydraulic trailers or stored at the port.

deugro offered up to four flexible storage locations at any given time, whereby the transformers waited on steel stools and beams for their final road transportation to the job sites. Further accessories were transported as inland shipments from the USA and Canada to the final job sites or storage locations. Once the transformers arrived at their destination, the installation of cargo onto the foundation took place. All transportation steps up to final installation were supervised by deugro and engineers from dteq Transport Engineering Solutions (dteq).

Challenges during execution

Transformers to Nova Scotia

Our route from the port to the site took us over a section of road that the local municipality was planning to have resurfaced and repaved. As a result, if we moved the four transformers (ranging from 150 to 200 metric tons) over the newly paved roads, deugro and ABB would have to accept all liability.

Solution: We had meetings with the local municipal authorities and requested they review their plans for the road work and see if there was any way to divert the work to other parts of the road that did not involve our travel path. They subsequently agreed to hold off paving our section of the road until the next season. deugro was able to deliver all four units by spring 2017, before the road paving continued.

Transformers to Newfoundland

Weather presented a challenge for each transformer move. The authorities only allow moves over clear roads. Thus, getting the finalized permits and escorts in place had to happen quickly.

Solution: We were in constant communication with the local DOT authorities to ensure we could move out of the port/staging area. Furthermore, we had to keep the units clear of snow while they were waiting to be transported.

General equipment

During the months of November and December 2016, we had more than 70 containers arrive at the Port of Halifax—an average of about 10 per week. The containers had to be pulled out, destuffed and sent back, and material sorted for delivery to two sites.

Solution: Due to a shortage of trucks during the holidays and into January, and a snow storm, we moved the cargo out as quickly as possible for the containers and the breakbulk, while trying to minimize any additional costs to ABB.

Project site storage

ABB was not able to receive all cargo at the site upon arrival. In particular indoor items, which made up 70 percent of the cargo, needed to have a secure, protected storage area.



Solution: deugro supported ABB in finding a reputable and reliable partner to serve as an indoor/ outdoor storage location for all cargo which could not yet be delivered to the Woodbine, Nova Scotia site.

For Newfoundland, we worked closely together with ABB to support the management of the warehouse and cargo coordination, which helped to ensure a successful project delivery on time.



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