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RWE Technology International

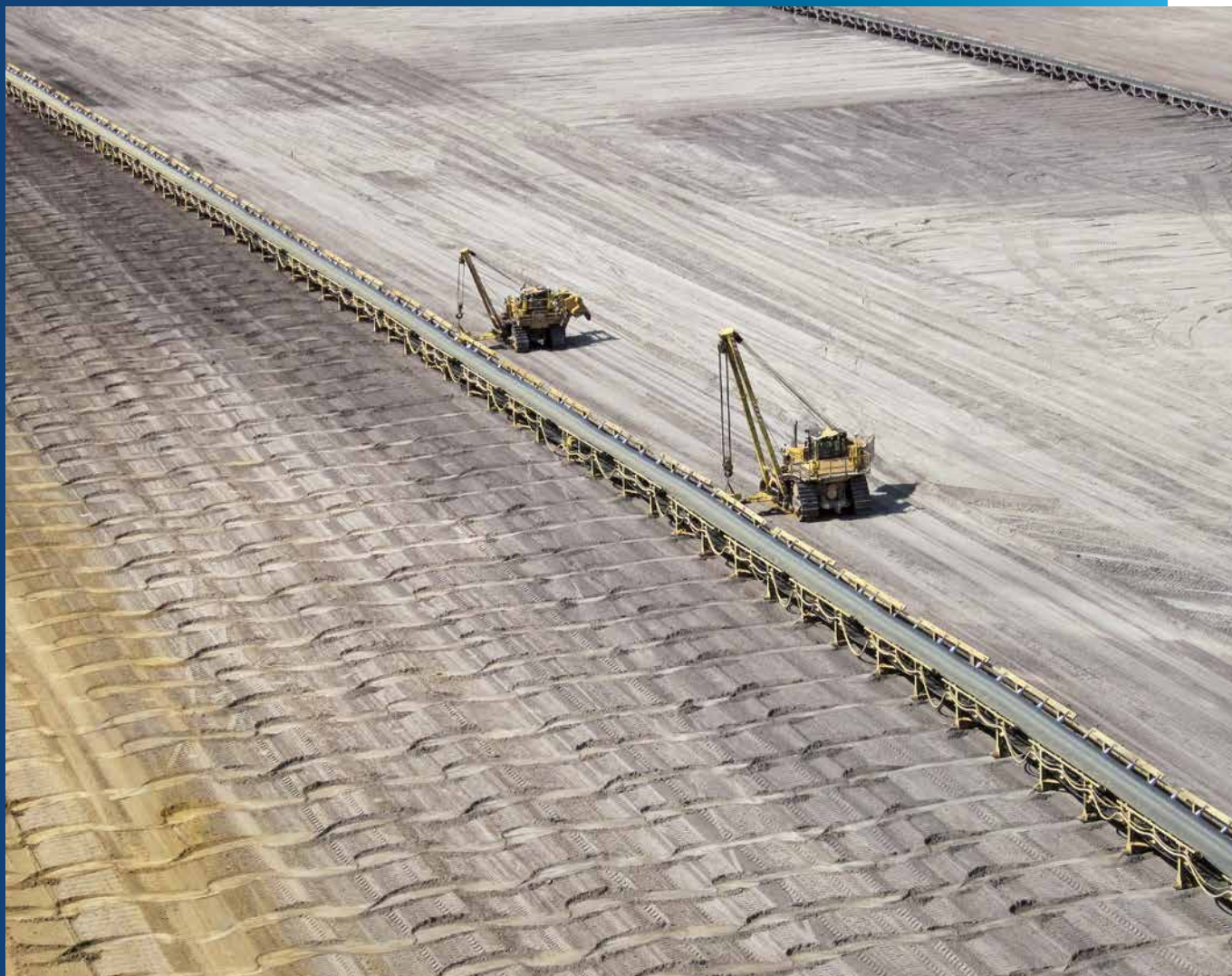
Mining Consultancy & Engineering Services.

Creating Opportunities. Enhancing Performance.



RWE

Powering. Reliable. Future.



1. About us.

RWE Technology International (RWETI) is a leading independent consulting and engineering company, providing services to various energy markets including mining, thermal generation, renewables and grids. With clients in more than 100 countries around the world, our expertise spans the full range of generation technologies, fuel sources including hard coal, lignite, nuclear, oil and gas, renewables and mining methods. We offer a diverse range of technical, professional and construction services to industrial, commercial and governmental customers across the globe. Our service portfolio includes project, process, scientific and systems consulting, construction, operations and maintenance.

Mining Heritage

We provide services to the global mining industry with special emphasis on open cast mining. Our mining expertise covers minerals and solid fuels and spans exploration, development, operations and rehabilitation. We draw on the extensive operation and engineering knowledge as well as the practical experience of RWE's three operating coal mines totalling an annual production of 100 Mt of lignite and 550 MBcm of waste. RWE operates a total of 230 km of conveyor belt systems in its own mines in Germany (namely: Hambach, Garzweiler, Inden). RWE's coal mine "Hambach" (Figure1) has a surface opening of 5 km by 7 km and is nearly 400 m deep including an annual production of 40 Mt of lignite and a displacement of 250 MBcm of waste. It is 100% operated by RWE on continuous mining equipment. Our reputation for independence, excellence and innovation have established us as the market leader in providing professional mining services that improve efficiency, reduce risk and deliver a competitive advantage for you. RWETI has executed many hard and softrock mining consulting projects around the world including:

- Due Diligence, Technical and Bankable
- Conceptual, Pre-Feasibility and Feasibility Studies
- Environmental Impact Assessment
- Least Cost Investment Planning
- Tendering, Procurement and Contract Administration
- Operations Management
- Operational Engineering Support
- Innovative Risk Management Solutions
- Technical Training
- Construction Management and Owners Engineering
- Project Development and Implementation
- Quality Management
- Equipment Testing
- Management Assistance



2. Our experts.

RWETI's success is driven by its multi-disciplinary team of world class experts consisting of: Project Managers, Quality Managers, Mining Engineers, Mine Planners, Geologists, Environmental Scientists, Economists and many other related disciplines.

Their combined expertise is strongly rooted in the vast operational experience of RWE's own assets and thus provides best practice methods as well as innovative solutions and techniques across the whole range of engineering disciplines required for mining projects in a variety of commercial and political environments.

Next to its core team, RWETI has access to more than 3,000 Engineers and Technicians within the RWE Group to further strengthen their capability in open cast mining.

By working with strong local project partners or drawing on locally available resources for additional regional knowledge, RWETI's experts combine global reach with local understanding.



3. Our services.

RWETI has successfully carried out projects financed or underwritten by major international lenders and international agencies including the World Bank, Asian Development Bank, European Bank for Reconstruction, European Agency for Reconstruction, and the United Nations.

RWETI's Management Systems are certified according to DIN ISO 9001 (Quality) and DIN ISO 14001 (Environmental). RWETI has been commended with several esteemed awards for work safety management, such as the safety award presented by the UK Royal Society for the Prevention of Accidents.

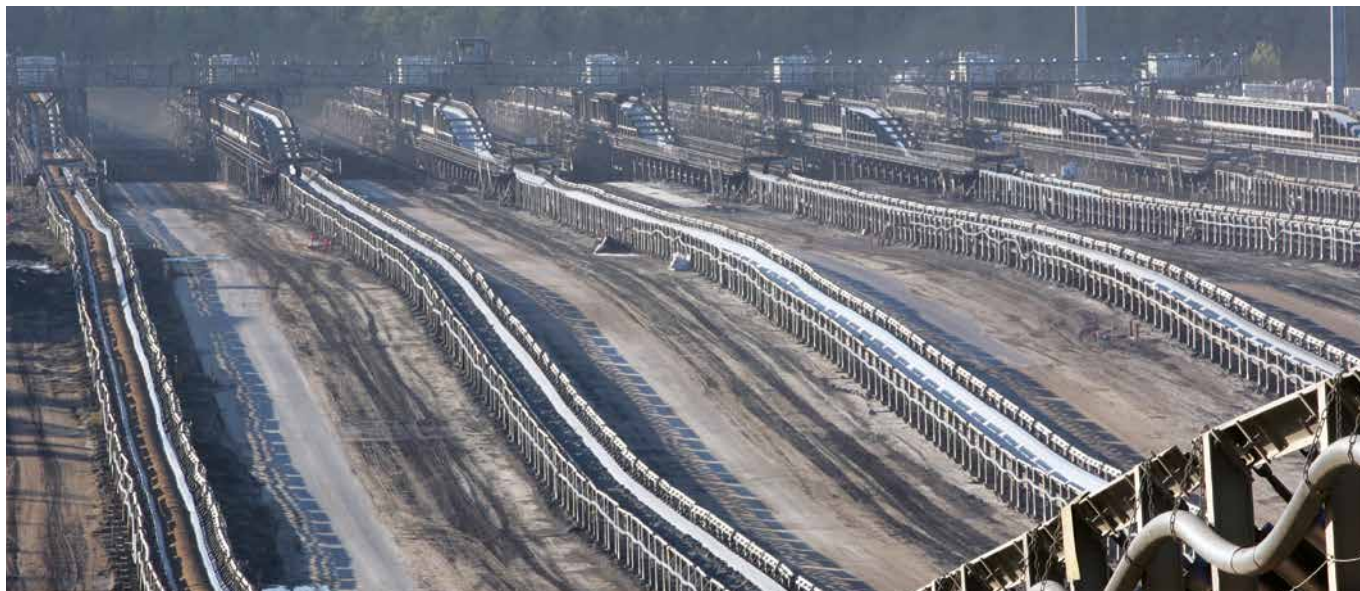
Based on our own extensive mining experience, RWETI provides assistance that cover all aspects of the mining cycle from early development to mine operation. Our services include exploration, resource and reserve estimation, project assessment and detailed engineering design, provision of assistance during construction, commissioning and at all stages of mine operation, including optimisation, rehabilitation and finally mine closure. We also provide independent technical support and advice to lenders and investors, to governments, law firms and insurance companies.

RWETI can plan and develop any open-cast mine, ensuring minimal impact on the surrounding environment throughout the whole life of the mine. RWETI assists in operation of clients open-cast mines and provides the necessary transfer of skills to future operators. Existing mines benefit from increased efficiency through RWE's state-of-the-art mining technology and techniques, for example In-Pit Crushing and Conveying (IPCC).

In addition to the above, RWE and the world's largest contract miner Thiess Pty Ltd. have established a global first joint venture to serve the mining industry with O&M services for continuous mining equipment. This joint venture was established in 2013 to meet the growing need for low-cost, sustainable mining solutions.

Mineral Potential Surveys & Exploration Management

Any search for mineral resources begins with an assessment of the mineral potential. Our experts review the geology, assisted by the interpretation of satellite images and geophysical data, where available. We review historical mining activity, including documentation of artisanal mining activities. As a result you have an inventory of potential mineral deposits to take the prospecting process further. Exploring a prospect is expensive. The risk of a prospect not being economical is high, so you will need all relevant information to be able to make the correct investment decision. We will manage this process for you, from reconnaissance surveys right through to detailed drilling campaigns. We lay out your sampling and drilling campaigns and select the drillers and assay laboratories. We make sure that the samples are correctly taken and analysed and interpret the data to guide further exploration work. Our experts will manage your exploration program efficiently, economically and transparently, with repeated reviews and decision points along the way.



Hydrology/Groundwater Modelling Management of groundwater and consequently dewatering of mine sites to ensure optimum operational conditions is a key aspect of our services. We carry out ground-water investigation studies, including laboratory analyses and the supervision and evaluation of drilling and pump testing programmes, ground water modelling studies with the world's most advanced 3-dimensional groundwater modelling software, and develop mine dewatering and groundwater management plans.

In addition, we can develop and implement large-scale groundwater infiltration programmes and carry out acid mine drainage mitigation studies, thereby assisting you in running your mine and groundwater programme in an environmentally responsible way.

Resource Estimation

The estimation of resources is the basis for determining the viability of a mineral deposit. Based on the results of geophysical and geological exploration campaigns, our geologists and mine planning experts set up computerised 3-dimensional geological mineral deposit models by the utilization of latest state-of-the-art software (Deswik™, Datamine™ and Surpac™). Our geologists are certified to sign resource estimations following internationally agreed standards in compliance with the CRIRSCO family and the JORC code.

Mine Design and Planning

Our development of mine design and mine plans are guided by our experience as a mine operator and as a reputable international consultant, as are our choices of mining method and equipment. Our mine plans optimise the economical mining of the deposit, while taking into account the equipment limitations and production targets. The resulting plans detail the run-of-mine tonnage and grades. Our experts provide detailed information including: How many staff, which equipment is required, where economical mining limits are and how waste dumps and tailings dams will develop throughout the life of the mine. The best mining and or equipment options will be elaborated and compared for the final decision.

Equipment Concept Studies

For any mining or bulk transportation problem there is more than one solution: Continuous mining methods (e.g. with bucket wheel excavators) or discontinuous shovel and truck operations, transportation by conveyor, truck or rail, or any combination thereof (e.g. In-Pit Crushing and Conveying – IPCC). We can determine the most appropriate concept for each situation. We look at the quantity and type of material to be mined and transported, the distance and changes of elevations to be covered, and we also consider the environment in which the system must operate – climate, available infrastructure, available suppliers and service, capabilities of the work force. Whether it's the high Andes, tropical India, or arctic Canada, we have been there. And since the bottom line counts, we balance investments, debt service and operating costs in a least-cost optimisation to come up with the best and most cost-effective solution.



Feasibility Studies

Our mining experts will determine whether your deposit has the potential to become a profitable mine, providing you with the level of detail required to transfer resources into reserves. Our studies range from simple concept studies, through pre-feasibility studies, to fully bankable feasibility studies and mine master plans. The studies include both technical and economic aspects for the life of the proposed mine. Our experts are sensitive to the impact the mine will have on the environment, the vegetation, surface and ground water, and of course the local population. Our efforts go beyond simply assessing the environmental effect of the mine; we revise the mine plan to minimise and mitigate environmental impact, ensuring that environmental protection is an integral part of the project.

Environmental Management

Our complete range of expert services will enable you to manage environmental performance more effectively. We can assess the environmental impacts of your business, whether in power generation or mining, and provide operations advice to maximize the value of your asset, within the local regulatory framework. Within the field of Environmental Management monitoring and reducing emissions is highly relevant. Thus, we specialized on Emission Control and are capable of supporting your business becoming more environmental friendly.

Tender Assistance

Bulk transport systems or tendering of contractor services and major mine equipment are significant investments. To assure to get the best value for money, we assist our clients throughout the tender process. We draw up and publish tender documents, evaluate the bids, recommend the most suitable bidder and assist you during the contract negotiations. We keep the tendering process transparent, showing the trade-off of quality for price. We help to make equipment functioning for the best price, without come-backs, failures or delays.

Training

It is well recognised that experienced, well-trained staff and management are vital to the successful running of a mine. RWETI's experts provide training in all aspects of mining, from mine design and operations to mine economics and management. Training can be provided at your site, at our offices, or at RWE mines and workshops.

Mine Development and Operations

The development of a new mine poses particular challenges on management and staff, since new staff has to be trained in operational, planning and maintenance procedures, and mining operations have to be fine-tuned in light of the specific conditions at the new mine, while staff are still getting familiar with the equipment. RWETI can manage the developing mine on behalf of the owner, whilst training local management and staff until they have phased into full operational control and responsibility. Thereafter, as and when required, our experts can provide expert assistance to mine management to overcome specific problems. Alternatively, we can continue to manage the mine operation for the remaining mine's life.

4. Our expertise.

Our clients include a wide and prestigious range of mining and other companies e.g. exploration & development companies, governments, multi utilities, mine operators, banks and other lender organizations, private equity investors. The following table shows our latest key projects:

Client/Project	Country	Project Details	Scope	Date
VALE SA Comparative Study	Brazil	Comparative study between S&T (shovel & trucks) vs. IPCC (In-pit Crushing and Conveying), mine planning (multi-mine, belt conveyor, surface miner, other techniques), training	TS, E	ongoing
Sindh Engro Coal Mining Company Technical Assistance	Pakistan	Coal Handling System Contract Negotiation Support and Design Review Report – Extension	TS, E	ongoing
Major Mining Company Technical assistance	Chile	Identifying the causes of belt misalignments of conveyors	TS, TO, E	ongoing
Energy Utility Company Technical Support	Serbia	Technical Support for construction of continuous mining machinery in lignite mines	TO, E	ongoing
Major Mining Company Technical Assistance	Chile	Assessment of Belt Splicing Station	TO, E	ongoing
Mining Company IPCC Study	Indonesia	IPCC Mining Study	TO	2018
Mine Operator Belt change project	Chile	Technical Audit of the Belt Conveyor Plant	TS	2017
SAHAKOL Equipment Co. Ltd Technical Assistance	Indonesia	Basic Engineering for overburden conveyor belt system	TS	2016
Energy Utility Company Technical Support	Hong Kong	Inspection and optimization of coal ship unloader	TO, TS	2016
EPC Solutions Provider Engineering Support	Chile	Engineering Support Mass Mining Method (MMM)	E	2016
Industrial Minerals Producer Technical Assistance – CME Evaluation	Australia	Provision of engineering services and advice for evaluation and selection and client options	TS	2016

Scope Legend

- E Engineering
- TS Technical Support
- CS Concept Study
- TO Technical Optimization



Client/Project	Country	Project Details	Scope	Date
Major Mining Company IPCC Study	Australia	Technical assistance for the replacement project	CS, TS	2016
Major Mining Company Technical Assistance – Production Optimization	Peru	Technical Assistance to the production optimization program of the material handling system at a copper mine	TS	2016
Major Mining Company Technical Assistance	Chile	Optimisation of several belt conveyor lines	TO	2016
Fertilizer Producer Technical Assistance, Selection of Mine Equipment	Peru	Review, design and equipment specification; Peru phase III	TS, TO	2016
Compania Minera Doña Ines de Collahuasi Technical Assistance	Chile	Review of the new crusher circuit for the continuation of the heap leaching operation past the year 2020	TS, TO	2016
Compania Minera Doña Ines de Collahuasi Technical Assistance Production Optimization	Chile	TA Production increase in a copper mine	TO, E	2016
Copper Mining Group Technical assistance	Chile	Capacity assessment of STMP conveyor system	TS	2016
SAHAKOL Equipment Co. Ltd Inspection management	Thailand	Inspection and optimization of coal mine	TS, TO, E	2015
Multi Utility Company Coal Quality Management	Pakistan	Coal Quality prediction and monitoring	TO, TS	2015
Mining Company IPCC Study	Norway	IPCC Scoping Study	TO, TS	2015
Plant engineering and construction specialist Technical Support	Chile	Technical Support by two RWE experts	TS	2015

Scope Legend

E	Engineering
TS	Technical Support
CS	Concept Study
TO	Technical Optimization

5. Quality, health, safety and environment.

RWETI is committed to effective quality management in order to understand and deliver services in line with our clients' requirements, with maximum effectiveness and focus on health, safety, environment and quality.

These commitments are reflected in the behaviour of the whole company and the way that our employees work at all times.

RWETI management systems are certified to

- ISO 9001 Quality Management Systems
- ISO 14001 Environmental Management Systems
- OHSAS 18001 Occupational Health & Safety Management Systems

and are applied to all of our projects.



