

**KWS**

POWERTECH  
TRAINING CENTER

# PROGRESS REPORT

KRAFTWERKSSCHULE E.V. – TRAINING FOR THE FUTURE

2016





# Foreword

The Progress Report of KWS PowerTech Training Center on hand informs member companies about basic and advanced training events conducted, continuative activities and projects as well as committee work during the report period of January 1, 2016 to December 31, 2016.

All members and customers continue to face the challenges brought about by political decisions affecting Germany's power industry. Gross electricity generation reached a new high at 648 TWh and so did the transnational electricity interexchange at approx. 60 TWh. 66 percent of all electricity generation came from fossil and nuclear sources while approx. 30 percent stemmed from renewable energies, which enabled the industry to provide its customers with an environment-friendly, affordable and dependable electricity supply. Successful flexibilization of thermal power plants yielded positive results as the occurrence of production hours with negative electricity prices decreased 23 percent compared with last year. The continuing problem of low overall electricity prices remains, however, necessitating cost-cutting measures in many of our member companies.

Attendance of Plant Attendant, Power Plant Operator and Power Plant Shift Supervisor training courses was high during the report period. Customer demand for on-site instruction continued to increase and was successfully met. In 2016, the first power plant was converted to production standby operations; more will follow through 2019. KWS assists business with customized seminars or training courses for qualification and skill retention.

Once again, our lignite, hard coal and CCGT power plant simulators were extensively employed for training by our members. The simulators permit a wide range of instruction option in the areas of process, grid as well as environmental technology. The simulator projects for block unit D of the Neurath lignite-fired power plant as well as the conversion of the Westfalen block unit E simulator reached new milestones. Nuclear technology seminars focused on the conveyance of fundamentals, operations managements and qualification retention. September saw, for the second time, the successful

organization of the expert convention on the technology and practice of nuclear power plant dismantling with accompanying exhibition at the Zwentendorf nuclear power plant in Austria.

In the area of renewable energies, courses for electrically qualified person as wind power installation fundamentals were conducted. Overall training demand in the field of partially biogenic thermal waste utilization was enjoyably high.

Various member companies address market challenges by conducting change and optimization measures. KWS accompanies such measures at the company and shift crew level with Best Practice workshops in the fields of social, methodical and individual skills development. Here, the focus was on employee workplace behavior, teamwork, communication, decision-making as well as control and supervision assignments.

International activities saw an exceptionally high degree of capacity utilization. Particular highlights were training courses for the operating personnel of CCGT facilities (3 x 4,800 MW) currently under construction by Siemens in Egypt as well as boiler operations training for engineers and crews of the hard coal-fired power plant (6 x 800 MW) erected at Kusile, South Africa, by Mitsubishi Hitachi Power.

In order to market KWS's offerings even better in the future, the project "Marketing and Communication" was launched. A new promotional film was made and the homepage redesigned. In the future, KWS will stand for

**K**nowledge **W**orkmanship **S**afety.

Quality management was completely revised in 2016 and converted to the DIN EN ISO 9001:2015 standard. The first surveillance audit yielded an outstanding result in verification and effectiveness with no deviations and deficiencies.

In conclusion, we would like to express our gratitude for the trust vested in our organization. We will continue to be a competent service provider for qualifying power plant personnel, organizational and personnel development counseling as well as for construction and evolution of power plant simulators at any time.



Ernst Michael Züfle  
Managing Director

# Course Program



# Table of Contents

3	Foreword
6	Performance in 2016
7	Conventional Power Plant Technology
8	Nuclear Technology/Radiation Protection
9	Simulator Training
10	Organization Development
11	Renewable Energies
12	International Activities
13	Organization
15	Facts and Figures
20	KWS in General

# Performance in 2016

## Services of KWS PowerTech Training Center: An overview

The range of KWS's services are best described with the terms basic and advanced training, qualification and counseling. KWS's basic training offerings meet the legal framework of Germany's Vocational Training Act, Occupational Safety Act and Atomic Energy Law. Plant Attendant, Power Plant Operator and Power Plant Shift Supervisor courses are unequivocally designed to provide member companies with qualified and certified personnel of the highest order. The wide range of KWS's advanced training offerings enables members to maintain, adapt or enhance the professional skills of its operating personnel. This area of services comprises certified training courses, officially approved courses, but also customized instruction measures. Such individual measures are typically tailored in a client-specific manner and conducted on the customer's premises. KWS's comprehensive training simulator pool permits offering member companies a wide range of in-depth training options for power plant operating personnel. Counseling is the latest addition to KWS's training offerings and concerns itself with the topics of management consultation and human resources development.

## NUMBER OF PARTICIPANTS, COURSES CONDUCTED, TRAINING MEASURES AND PARTICIPANT DAYS: ALL DEPARTMENTS

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
Conventional Power Plant Technology	107	1.267	29.412
Nuclear Technology/Radiation Protection	55	615	2.158
Simulator Training	82	332	1.347
Organization Development	11	9	27
Renewable Energies	13	46	507
International Activities	21	581	3.137
<b>Total</b>	<b>289</b>	<b>2.850</b>	<b>36.588</b>

## Conventional Power Plant Technology

Basic and advanced theoretical training comprises all instruction measures designed to amplify, expand or renew the professional knowledge and skills of employees who have already completed a first stage of vocational training. Qualification demands on each individual power plant employee increase, with regard to both technical and social skills. The concept of lifelong learning is part of working life, especially in a complex technical environment like a power plant.

### NUMBER OF PARTICIPANTS, COURSES CONDUCTED AND PARTICIPANT DAYS: POWER PLANT OPERATORS AND POWER PLANT SHIFT SUPERVISORS AND CUSTOMER-SPECIFIC ADVANCED TRAINING MEASURES

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Operators	6	117	9.360
Power Plant Shift Supervisors – Production	5	59	9.710
Power Plant Shift Supervisors – Production Electrical and Control Engineering	1	12	2.640
Advanced Training Measures	61	696	4.623
Customer-Specific Advanced Training Measures	34	383	3.079
<b>Total</b>	<b>107</b>	<b>1.267</b>	<b>29.412</b>

## Nuclear Technology/Radiation Protection

Nuclear Technology training is three-pronged:

1. Nuclear power plant personnel training
2. Nuclear power plant personnel skill retention and instruction, respectively
3. Radiation protection training

The training lineup comprises officially approved courses for qualification acquisition of responsible shift personnel and officially approved courses for qualification acquisition in radiation protection. Instruction measures for personnel otherwise employed in nuclear power installations follow the respective guideline of Germany's Federal Environment Ministry. In addition to skill acquisition courses, KWS's training measures also include a wide range of skill retention training options.

### NUMBER OF PARTICIPANTS, COURSES CONDUCTED AND PARTICIPANT DAYS: NUCLEAR TECHNOLOGY/RADIATION PROTECTION

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Shift Supervisors– Radiation Protection	1	3	159
Nuclear Basics	2	17	882
Skill Retention/ Instruction of Nuclear Power Plant Personnel	31	367	570
customized measures	21	228	547
<b>Total</b>	<b>55</b>	<b>615</b>	<b>2.158</b>

## Simulator Training

Simulator training permits risk-free and efficient rehearsal of normal and abnormal operational power plant conditions. Apart from learning to handle installations safely, trainees also gain insight into plant technology interaction. Rehearsing critical plant conditions inspire operating personnel confidence when confronted with such situations. Beside operations training, social skills like teamwork, leadership, and decision-making are established, which enables a continuous improvement process in power plant operations.

### NUMBER OF PARTICIPANTS, TRAININGS CONDUCTED AND PARTICIPANT DAYS: SIMULATOR TRAINING

January 01 – December 31, 2016	Trainings conducted	Number of Participants	Number of Participant Days
Hard Coal/Lignite/Gas/Oil 300 MW (FOKS)	4	19	95
Lignite 600/1100 MW	34	128	557
Hard Coal 800 MW	23	110	368
Hard Coal 1100 MW	2	8	20
CCGT 750-S/D (SPPA-T2000)	3	16	72
CCGT 750-3 (SPPA-T3000)	16	51	235
<b>Total</b>	<b>82</b>	<b>332</b>	<b>1.347</b>

## Organization Development

Various member companies address market challenges by conducting change and optimization measures. KWS accompanies such measures at the company and shift crew level with Best Practice workshops in the fields of social, methodical and individual skills development. Here, the focus was on employee workplace behavior, teamwork, communication, decision-making as well as control and supervision assignments. It is not easy to determine whether workplace processes and interaction function optimally or not because many parameters are involved. With the help of the staffers involved, workplace processes and interaction within as well as beyond shifts and departments are analyzed and potential improvements identified. Best Practice workshops help open creative opportunities, enabling an informal transfer of knowledge and experience among shift crews and generations that involves and conveys responsibility to all staffers. Optimization standards transcending shift crews and department are developed in cooperation with seasoned power plant operatives because nobody knows a place of business and its peculiarities better than the people who work there. As a result, each individual location comes up with its specific best possible solutions for operational excellence. In 2016, measures for improved shift handover, power plant fleet process standardization and malfunction analysis were conducted.

### NUMBER OF PARTICIPANTS, COURSES CONDUCTED, MEASURES AND PARTICIPANT DAYS: ORGANIZATION DEVELOPMENT

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
Organization Development	11	9	27

## Renewable Energies

Growth in renewable energies is still strong and is expected to continue, both in terms of installed capacity and electricity generation. Wind power development is particularly fast-paced with more than 26,000 windpower installations in Germany alone that need to be serviced, maintained and operated. Even today, the industry is faced with a significant shortfall in skilled personnel. Given the ongoing expansion of wind power and demographic change, this shortfall is likely to increase. A crucial remedy is practice-oriented personnel qualification tailored to market needs. In cooperation with its partners, KWS is already offering a wide-ranging, in-depth lineup from climbing instruction to CCI-certified wind power installation service technician training.

Bio-energy, be it biomass or biogas, is also seeing stable growth. Apart from a multitude of smaller facilities, industrial applications are becoming increasingly important. The know-how necessary to operate and maintain such installations is available from KWS in training courses designed for thermal power plant operations such as Plant Attendant training.

The use of hydropower plants has a long tradition in Germany and Austria, but significant growth is not to be expected anymore. For the purpose of skill retention, KWS offers two complementary training courses that cover market demand in this area almost completely.

### NUMBER OF PARTICIPANTS, COURSES CONDUCTED AND PARTICIPANT DAYS: RENEWABLE ENERGIES

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
Renewable Energies	13	46	507

## International Activities

KWS is capable of providing international customers with virtually all of the offerings from the aforementioned areas of expertise. Additionally, training requirement and workforce potential analyses consisting of written exams, group and individual exercises and an expert interview may be employed by customer request to compare existing staffer skills with German standards. The results of such analyses may be used to conceive target group-specific instruction plans. In 2016, training measures were conducted in Egypt, Saudi-Arabia, Algeria, South Africa and Turkey as well as in various European countries.

### NUMBER OF PARTICIPANTS, COURSES CONDUCTED, MEASURES AND PARTICIPANT DAYS: INTERNATIONALE AKTIVITÄTEN

January 01 – December 31, 2016	Courses conducted	Number of Participants	Number of Participant Days
International Activities	21	581	3.137

# Organization

## Board of Directors

KWS's Board of Directors implements resolutions made by the Member Assembly and is obligated to do anything that is beneficial to the goals of the association. Its main tasks are the compilation of the annual Progress Report, approval of annual accounts, preparation of the Member Assembly and submission of the investment, finance and business plan. Furthermore, the Board of Directors is tasked with appointing, dismissing and supervising the management.

The Board of Directors convened two times during the report period:

89<sup>th</sup> meeting - June 22<sup>th</sup> 2016

90<sup>th</sup> meeting - October 27<sup>th</sup> 2016

Altmann, Hubertus, (Chairman)  
Member of the Board of Directors (Power Plant Department) of Vattenfall Europe Mining AG/  
Vattenfall Europe Generation AG, Cottbus  
From October 2016 Member of the Board of Directors of Lausitz Energie Kraftwerke AG/  
Lausitz Energie Bergbau AG, Cottbus

Gruber, Karl Heinz, Dipl.-Ing., Dr. (deputy Chairman)  
Member of the Management of VERBUND Hydro Power AG, Vienna/Austria

Bockamp, Stefan, Dr.  
Director Operations Steam & Biomass  
Uniper Kraftwerke GmbH, Düsseldorf/Germany  
(From September 2016)

Breidenbach, Norbert  
Member of the Board of Directors  
of the Mainova AG, Frankfurt am Main/Germany

Declercq, Annick  
Technical Training Manager,  
BEE-GENERATION der GDF SUEZ Branche Energy Europe,  
Generation-HR, Brussels/Belgium (to Januar 2016)

Reinhard, Volker  
Head of HR Production Department (P-AE),  
EnBW Energie Baden-Württemberg AG, Stuttgart/Germany

Strumpf, Lutz  
Managing Director/Power Plant Director of  
Helmstedter Revier GmbH, Buschhaus Power Plant,  
Helmstedt/Germany

Vermeyen, Raf, Managing Director  
of the Engie Kraftwerk Wilhelmshaven GmbH & Co. KG,  
Berlin/Germany  
(to September 21<sup>th</sup> 2016)

Winkel, Erwin  
Member of the Board of Directors of the RWE Power AG, Köln

## Management

Ernst Michael Züfle

## Financial and Legal Committee

The Financial and Legal Committee of KWS PowerTech Training Center assists and advises the board of directors and the management in all financial and legal matters.

The committee discussed the audit report which was compiled by BDO AG Wirtschaftsprüfungsgesellschaft, Zweigniederlassung Essen branch office, on the financial statement for 2015, the review of operation including the attachment and recommended that the board approve KWS's financial statement for 2015 as is.

Consultation of the economic, investment and financial plans for the business year 2017 was carried out by the Financial and Legal Committee. It recommended to the Board that it submit them in the general meeting in 2016.

The Financial and Legal Committee also concerned itself with medium-term business planning designed for a five-year period and with the impact of the implemented consolidation measures.

The following activities took place during the report period:

56<sup>th</sup> meeting - May 11<sup>th</sup> 2016

57<sup>th</sup> meeting - October 04<sup>th</sup> 2016

Eck, Jens, Dr. (Chairman)  
Vattenfall Europe Generation AG, Cottbus/Germany  
From October 2016  
Lausitz Energie Kraftwerke AG/  
Lausitz Energie Bergbau AG, Cottbus/Germany

Frey, Rainer, Magister  
VERBUND-Hydro Power GmbH, Vienna/Austria

Berger, Markus  
Uniper Kraftwerke GmbH, Düsseldorf/Germany

Strehlau, Gabriele  
Head of Accounting and Finances Department,  
RWE Generation SE, Essen/ Germany

Wachter, Klaus  
EnBW Erneuerbare und Konventionelle Erzeugung AG,  
Stuttgart/Germany

## Training Committee

The KWS Training Committee advises and assists the board of directors and management in their task, such as determining admission criteria for training courses, admission to courses (if so determined in the admission criteria), collaboration during examinations conducted by KWS with regard to examination regulations. Other activities of the committee involve filing applications to the incorporated society upon which KWS is legally based for the procurement of instruction materials and equipment as well as managing various other school- and training-related affairs.

In its sessions during the report period, the Training Committee concerned itself with the results of the admission exams for the 133<sup>rd</sup> and 134<sup>th</sup> Power Plant Shift Supervisor – Production training course and those of the 47<sup>th</sup> Power Plant Shift Supervisor – Production Electrotechnology/Control Engineering training course.

Other consultations topics during sessions were

- KWS reports on current training activities and new projects,
- Exchange of basic and advanced training program information and experience,
- Quality control of power plant shift supervisor training .

The Training Committee convened twice during the report period:

125<sup>th</sup> meeting - July 07<sup>th</sup> 2016

126<sup>th</sup> meeting - December 08<sup>th</sup> 2016

Bieder, Markus (Chairman)  
Stadtwerke Münster GmbH, Münster/Germany

Wassermann, Karsten (Deputy Chairman)  
E.ON Kernkraft GmbH, Gemeinschaftskernkraftwerk Grohnde GmbH, Emmerthal/Germany

Bernrath, Maximilian  
RWE Power AG, Kraftwerk Neurath, Grevenbroich/ Germany

Christensen, Erland  
VGB PowerTech e.V., Essen/ Germany

Hager, Frank, Ministerialrat  
Ministry of Climate, Environment, Agriculture,  
Nature- and Consumer Protection, Düsseldorf/ Germany

Jedamzik, Bernd  
EnBW Energie Baden-Württemberg AG, Karlsruhe/ Germany

Kirstein, Klaus-Dieter  
KDK Consulting, Düsseldorf/ Germany

Kurzmann-Friedl, Christof, DI  
VERBUND Thermal Power GmbH & Co KG, Graz/Austria

Lang, Martin, Prof. Dr.-Ing.  
University Duisburg-Essen/ Germany

Palm, Torsten  
Vattenfall Europe Generation AG, Bohlen/ Germany

Paus, Christoph  
E.ON SE, Essen/ Germany

Reismann, Käthe  
Chamber of Commerce and Industry of Essen, Essen/ Germany

Schletter, Gert  
Vattenfall Europe Generation AG, Kraftwerk Jänschwalde, Peitz  
From October 2016: Lausitz Energie Kraftwerke AG/ Kraftwerk Jänschwalde

Schuknecht, Michael, Dr.  
German technical inspection association north (TÜV Nord)  
Systems GmbH & Co KG, Essen/ Germany

Stoll, Bernd  
Stadtwerke Hannover AG, Hannover/ Germany

Wiegel, Michael  
RWE Power AG, Kraftwerk Gersteinwerk, Werne/ Germany

Ernst Michael Züfle  
KRAFTWERKSSCHULE E.V., Essen/ Germany

Consultant:  
Nina Woydack  
KRAFTWERKSSCHULE E.V., Essen/ Germany

# Facts and Figures

## Members

### Membership of the KRAFTWERKSSCHULE E.V.

The KRAFTWERKSSCHULE E.V. is a joint association of power plant operators and pursues exclusively and directly not-for-profit aims within the framework of vocational training by means of programs for training and advanced training of skilled workers for power plants, maintenance of facilities for these activities, responsibility for holding examinations as well as maintaining the accommodation and catering facilities for the training participants.

The work of the KWS focuses on the training requirements of their ordinary members, the power plant operators.

KWS members benefit from a 25 percent rebate on all services provided by the association. This rebate applies to all training measures, instruction and specialist publications, accommodations in the apartment building, counseling etc.

In order to ensure that the KWS can continue to serve in the long-term it is necessary that all power plant operators and other interested organizations support them by becoming members.

According to the KWS' statutes it differentiates between ordinary members, affiliated members and sponsoring members. The KWS would be pleased to assist you in any questions regarding the organization and membership as well as its statutes and subscription fee regulations. Further information can be found on the Internet at "[www.kraftwerksschule.de](http://www.kraftwerksschule.de)".

### Ordinary Members

Abfallwirtschaftsbetrieb des Landkreises Neu-Ulm,  
Weißenhorn

Abfallwirtschaftsgesellschaft mbH Wuppertal, Wuppertal

AGR Betriebsführung GmbH, Herten

AK Energie GmbH, Osnabrück

AllessaChemie GmbH, Werk Cassella-Offenbach, Frankfurt

AMK Abfallentsorgungsgesellschaft des Märkischen  
Kreises mbH, Iserlohn

AVEA GmbH & Co. KG, Leverkusen

AVG Abfallentsorgungs- und Verwertungsgesellschaft  
Köln mbH, Köln

AVG Abfall-Verwertungs-Gesellschaft mbH, Hamburg

B+S Papenburg Energie GmbH, Papenburg

Basell Polyolefine GmbH, Wesseling

BASF SE, Ludwigshafen

Bayer AG, Bergkamen

Bayer AG, Berlin

Berliner Stadtreinigungsbetriebe,

Müllheizkraftwerk Ruhleben, Berlin

BHW Beeskow Holzwerkstoffe GmbH,

Werk Beeskow, Beeskow

Biopower SKW GmbH, Eberhardzell

Boehringer Ingelheim Pharma GmbH & Co. KG, Ingelheim

BS Energy Braunschweiger Versorgungs-AG & Co. KG,  
Braunschweig

Bremerhavener Entsorgungsgesellschaft mbH, Bremerhaven

CURRENTA GmbH & Co. OHG, Leverkusen

Daimler AG, Sindelfingen

DREWAG Stadtwerke Dresden GmbH, Dresden

DS Smith Paper Deutschland GmbH, Aschaffenburg

DS Smith Paper Deutschland GmbH, Witzenhausen

DSM Nutritional Products GmbH, Grenzach-Wyhlen

EBE Holzheizkraftwerk GmbH, Emlichheim

EDF LUMINUS N.V., Centrale Ringvaart, Gent/Belgien

EDF LUMINUS N.V., Seraing/Belgien

EDF S.A. - SCAN FOURNISSEURS, Paris-Clamart/Frankreich

EEW Energy from Waste Helmstedt GmbH, Helmstedt

Egger Holzwerkstoffe Brilon GmbH & Co. KG, Brilon

EGK Entsorgungsgesellschaft Krefeld GmbH & Co. KG, Krefeld

Electrabel NV/SA, Brüssel/Belgien

EnBW Energie Baden-Württemberg AG, Stuttgart

EnBW Kernkraft GmbH, Obrigheim

Energie AG Oberösterreich Kraftwerke GmbH, Linz/Österreich

Energie Anlage Bernburg GmbH, Bernburg

Energie und Wasser Potsdam GmbH, Potsdam

Energieservice Westfalen Weser GmbH, Kirchlengern

Energieversorgung Oberhausen AG, Oberhausen

Energieversorgung Offenbach AG

(MHKW Offenbach und HKW Offenbach), Offenbach

Enertec Hameln GmbH, Hameln

Engie, Berchem/Belgien

Entsorgung + Recycling Zürich, Zürich/Schweiz

Erlanger Stadtwerke AG, Erlangen

EVI Abfallverwertung B.V. & Co. KG, Laar

EVN AG, Maria Enzersdorf/Österreich

Evonik Industries AG, Marl

Evonik Industries AG, Darmstadt

FES Frankfurter Entsorgungs- und Service GmbH, Frankfurt

Freudenberg Service KG, Weinheim

FUG Fernwärme Ulm GmbH, Ulm

FunderMax GmbH, St. Veit a.d. Glan/Österreich

Gemeinschaftskraftwerk Bergkamen A OHG, Bergkamen	Merck KGaA, Darmstadt
Gemeinschaftskraftwerk Grohnde GmbH & Co. OHG, Emmerthal	MHB Hamm Betriebsführungsgesellschaft mbH, Hamm
Gemeinschaftskraftwerk Schweinfurt GmbH, Schweinfurt	MIBRAG Mitteldeutsche Braunkohlegesellschaft mbH, Zeitz
Gemeinschafts-Müllverbrennungsanlage Niederrhein GmbH, Oberhausen	Mohn media Mohndruck GmbH, Gütersloh
GfA Gemeinsames Kommunalunternehmen für Abfallwirtschaft, Olching	Moritz J. Weig GmbH & Co. KG, Mayen
Grosskraftwerk Mannheim AG, Mannheim	M-real Zanders GmbH, Bergisch-Gladbach
Hamburger Hungária Kft., Dunaújváros/Ungarn	Müllheizkraftwerk Kassel GmbH, Kassel
Harmuth Entsorgung GmbH, Essen	Müllheizkraftwerk Rothensee GmbH, Magdeburg
HEB GmbH, Hagener Entsorgungsbetrieb, Hagen	Müllverbrennung Kiel GmbH & Co. KG, Kiel
Heizkraftwerksgesellschaft Cottbus mbH, Cottbus	Müllverbrennungsanlage Bielefeld-Herford GmbH, Bielefeld
Heizkraftwerk Pfaffenwald der Universität Stuttgart, Stuttgart	Münchener Stadtentwässerung, München
Heizkraftwerk Pforzheim GmbH, Pforzheim	Munksjö Paper GmbH, Aalen
Heizkraftwerk Würzburg GmbH, Würzburg	MVV Umwelt O&M GmbH, Mannheim
Henkel AG & Co. KGaA, Düsseldorf	N-ERGIE Aktiengesellschaft, Nürnberg
HIM GmbH, Biebesheim	Naes Belgium BVBA HR+Business Service, Tessenderlo/Belgien
Huntsman P&A Germany GmbH, Duisburg	NOMAC, Jeddah/Saudi Arabien
IHKW Industrieheizkraftwerk Andernach GmbH, Andernach	Norske Skog Bruck GmbH, Bruck/Österreich
InfraServ GmbH & Co. Gendorf KG, Burgkirchen	NUON Energie und Service GmbH, Heinsberg
InfraServ GmbH & Co. Höchst KG, Frankfurt am Main	OMV Refining & Marketing GmbH, Wien/Österreich
InfraServ GmbH & Co. Wiesbaden KG, Wiesbaden	Oxea GmbH, Werk Ruhr Chemie, Oberhausen
IWB, Basel/Schweiz	Papierfabrik Palm GmbH & Co. KG, Wörth
Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH (JEN), Jülich	Pfeifer Holz Lauterbach GmbH, Lauterbach
K + S Kali GmbH, Philippsthal	Phönix Operation and Maintenance Company LLG, Oman/Oman
Kabel Premium Pulp & Paper GmbH, Hagen	PreussenElektra GmbH, Hannover
Kernkraftwerk Gösgen-Däniken AG, Däniken/Schweiz	Rabigh Arabian Water & Electric Company, Rabigh City/Saudi Arabien
Knapsack Power GmbH & Co. KG, Düsseldorf	RAG Anthrazit Ibbenbüren GmbH, Ibbenbüren
KNG Kraftwerks- und Netzgesellschaft mbH, Rostock	Raubling Papier GmbH, Raubling
Kraftwerke Mainz-Wiesbaden AG, Mainz	REMONDIS Thermische Abfallverwertung GmbH, Staßfurt
Kraftwerk Mehrum GmbH, Hohenhameln	Reno De Medici Arnsberg GmbH, Arnsberg
Kraftwerk Obernburg GmbH, Obernburg	RheinEnergie AG, Köln
Kraftwerk Schwedt GmbH + CO. KG, Schwedt	RKB Raffinerie-Kraftwerks-Betriebs GmbH, Leuna
Kreis Weseler Abfallgemeinschaft mbH & Co. KG, Kamp-Lintfort	RWE Generation–NL B.V., Geertruidenberg/Niederlande
Langerlo N.V., Genk/Belgien	RWE Generation UK PLC, Didcot B CCGT Power Station, Oxfordshire/Großbritannien
Lausitz Energie Kraftwerke AG, Cottbus	RWE Generation SE, Essen
Linz Strom GmbH für Energieerzeugung, -verteilung und Telekommunikation, Linz/Österreich	Salzburg AG, Salzburg/Österreich
MAINOVA AG, Frankfurt am Main	Salzgitter Flachstahl GmbH, Salzgitter
Mark-E AG, Hagen	Sappi Alfeld AG, Alfeld
	Sappi Austria Produktions-GmbH & Co. KG, Werk Gratkorn, Gratkorn/Österreich
	Sappi Ehingen GmbH, Ehingen
	SCA HYGIENE PRODUCTS GmbH, Mannheim
	Schluchseewerk AG, Laufenburg

- SchwörerHaus KG, Hohenstein  
 Solvay Chemicals GmbH, Rheinberg  
 Solvay Acetow GmbH, Freiburg  
 Spreerecycling GmbH & Co. KG, Spremberg  
 SRS Eco Therm GmbH, Salzbergen  
 Stadtreinigung Hamburg, Hamburg  
 Stadtwerke Augsburg Energie GmbH, Augsburg  
 Stadtwerke Bielefeld GmbH, Bielefeld  
 Stadtwerke Duisburg AG, Duisburg  
 Stadtwerke Düsseldorf AG, Düsseldorf  
 Stadtwerke Flensburg GmbH, Flensburg  
 Stadtwerke Frankfurt (Oder), GmbH, Frankfurt (Oder)  
 Stadtwerke Hannover AG, Hannover  
 Stadtwerke Heidelberg Netze GmbH, Heidelberg  
 Stadtwerke Karlsruhe GmbH, Karlsruhe  
 Stadtwerke Leipzig GmbH, Leipzig  
 Stadtwerke Münster GmbH, Münster  
 Stadtwerke Rosenheim GmbH & Co. KG -Müllheizkraftwerk-, Rosenheim  
 Stadtwerke Rostock AG, Rostock  
 Stadtwerke Saarbrücken GmbH, Saarbrücken  
 Stadtwerke Schwerin GmbH, Schwerin  
 Statkraft Markets GmbH, Düsseldorf  
 Städtische Werke Energie + Wärme GmbH, Kassel  
 STEAG GmbH, Essen  
 STEAG GmbH Kraftwerk Voerde, Essen  
 STEAG Power Saar GmbH, Saarbrücken  
 Stora Enso Maxau GmbH & Co. KG, Karlsruhe  
 Stora Enso Sachsen GmbH, Eilenburg  
 SWB Energie- und Wasserversorgung Bonn/Rhein-Sieg GmbH, Bonn  
 swb Entsorgung GmbH, Müllheizwerk Bremen, Bremen  
 swb Erzeugung GmbH & Co. KG, Bremen  
 SWM Services GmbH, München  
 SWN Stadtwerke Neumünster GmbH, Neumünster
- Technische Betriebe Solingen (TBS), Solingen  
 Thüringer Energie AG, Erfurt  
 Thyssen Krupp Steel Europe AG, Duisburg  
 TWL Technische Werke Ludwigshafen AG, Ludwigshafen
- Uniper Benelux N.V., Rotterdam/Niederlande  
 Uniper Kraftwerke GmbH, Hannover  
 UPM-Kymmene Austria GmbH, Steyrermühl/Österreich
- Vattenfall Europe New Energy Service GmbH, Hamburg  
 Vattenfall Europe Wärme AG, Berlin  
 Vattenfall Heizkraftwerk Moorburg GmbH, Hamburg  
 Vattenfall Wasserkraft GmbH, Cottbus
- Vattenfall Wärme Hamburg GmbH, Hamburg  
 Vattenfall Europe Nuclear Energy GmbH, Hamburg  
 VERBUND Hydro Power GmbH, Wien/Österreich  
 VERBUND Thermal Power GmbH & Co. KG, Neudorf ob Wildon/Österreich  
 voestalpine Stahl GmbH, Linz/Österreich  
 VSE AG, Saarbrücken  
 Vulkan Energiewirtschaft Oderbrücke GmbH, Eisenhüttenstadt  
 VW Kraftwerk GmbH, Wolfsburg
- Wels Strom GmbH, Wels/Österreich  
 Wien Energie GmbH, Wien/Österreich  
 WSW Energie & Wasser AG, Wuppertal  
 WUPPERVERBAND, Wuppertal
- ZAK Energie GmbH, Kempten  
 Zweckverband Abfallverwertung Südostbayern, Burgkirchen  
 Zweckverband Abfallwirtschaft Saale-Orla, Pößneck  
 Zweckverband für Abfallwirtschaft in Nordwest-Oberfranken, Dörfles-Esbach  
 Zweckverband für Abfallwirtschaft Südwestthüringen (ZAST), Zella-Mehlis  
 Zweckverband Müllheizkraftwerk Stadt und Landkreis Bamberg, Bamberg  
 Zweckverband Müllverwertung Schwandorf, Schwandorf  
 Zweckverband Müllverwertungsanlage, Ingolstadt  
 Zweckverband Restmüllheizkraftwerk Böblingen (RBB), Böblingen
- 3M Deutschland GmbH, Wuppertal
- Affiliated Members**  
 DATF Deutsches Atomforum e.V., Berlin  
 DMT GmbH & Co. KG, Essen  
 Fachverband Dampfkessel-, Behälter- und Rohrleitungsbau e.V., Düsseldorf  
 FGW e.V. –Fördergesellschaft Windenergie und andere Erneuerbare Energien, Berlin  
 GfS Gesellschaft für Simulatorschulung mbH, Essen  
 INTAMT e.V., Düsseldorf  
 Technische Universität München, Garching  
 VGB PowerTech e.V., Essen  
 VIK Verband der Industriellen Energie- und Kraftwirtschaft e.V., Essen

### Sponsoring Members

ABB AG, Power Systems Division, Mannheim  
 AREVA GmbH, Offenbach am Main  
 AWARDBRAND Limited,  
 Chelsea Harbour London/Großbritannien  
 Baumgarte Boiler Systems GmbH, Bielefeld  
 DURAG process & systems technology GmbH, Hamburg  
 Hans Eichner GmbH & Co. KG, Bergheim  
 Energiewerke Nord GmbH, Lubmin  
 EWEX-ENGINEERING GMBH & CO. KG, Ratingen  
 Holter Regelarmaturen GmbH & Co. KG, Holte-Stutenbrock  
 INP International Projects-Engineering & Services,  
 Johannesburg/Südafrika  
 KONRAD Meß- & Regeltechnik GmbH, Gundremmingen  
 Mitsubishi Hitachi Power Systems Europe GmbH, Duisburg  
 OffTEC Base GmbH & Co. KG, Enge-Sande  
 Rheinmetall Defence Electronics GmbH, Bremen  
 SalesEnergy International, Neusäß  
 SCGP Excellence Training Center Co. LTD., Bangkok/Thailand  
 Seiko Flowcontrol Ges.m.b.H., Stockerau/Österreich  
 Siemens AG, Erlangen  
 Siemens AG, Essen  
 S.T.E.P. Consulting GmbH, Aachen  
 Uniper Anlagenservice GmbH, Gelsenkirchen  
 Westinghouse Electric Germany GmbH, Mannheim

### Membership Development

On December 31<sup>st</sup>, 2016, the KRAFTWERKSSCHULE E.V. had 229 members, 198 of which were ordinary, 9 were affiliated and 22 were sponsoring members.

One company joined KWS as ordinary member, one as affiliated member and two as sponsoring members during the report period.

Six ordinary, one affiliated and four sponsoring members left KWS.

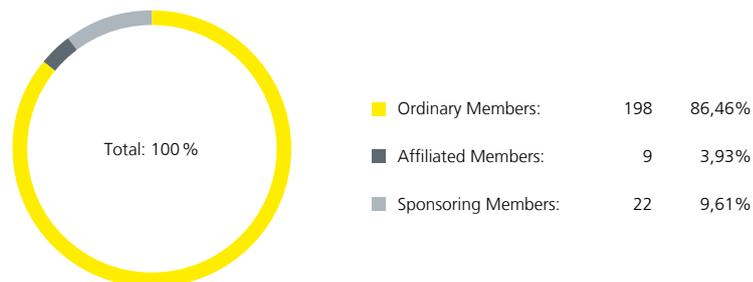
Using the maximum continuous steam performance calculations to assess the contributions of all ordinary member companies in the reporting year the total performance was 341,445.27 t/h.

35 member companies are based outside of Germany, namely:

- fifteen companies in Austria,
- five companies in Belgium,
- one company in France,
- two companies in Great Britain,
- one company in Hungary,
- two companies in the Netherlands,
- one company in Oman,
- two companies in Saudi Arabia,
- two companies in South Africa,
- three companies in Switzerland,
- one company in Thailand.

The continuous steam performance of the foreign member companies adds up to 44,854.09 t/h or approximately 13.14 % of the total amount of all ordinary members.

## MEMBERS



## OVERVIEW, SUBDIVIDED BY UTILITY MARKET SEGMENTS:

	Ordinary Members		Total Steam Performance	
	Number	Percentage %	t/h	Percentage %
Public Utilities	94	47,47	280.856,38	82,26
Industrial Business	104	52,53	60.588,89	17,74
<b>Total</b>	<b>198</b>	<b>100,00</b>	<b>341.445,27</b>	<b>100,00</b>

## BREAKDOWN OF INSTALLED MAXIMUM CONTINUOUS STEAM PERFORMANCE OF ALL ORDINARY MEMBERS:

	Ordinary Members		Total Steam Performance	
	Number	Percentage %	t/h	Percentage %
0–100 t/h	43	21,72	1.729,38	0,51
101–500 t/h	90	45,45	22.723,54	6,65
501–1.000 t/h	18	9,09	12.879,66	3,77
above 1.000 t/h	47	23,74	304.112,69	89,07
<b>Total</b>	<b>198</b>	<b>100,00</b>	<b>341.445,27</b>	<b>100,00</b>

# KWS in General

## Discharge of Heinrich Nacke

On April 19th, 2016, Heinrich Nacke, Deputy Managing Director of KWS for many years, took his leave to go into his well-deserved retirement. 121 guests from far and wide were present to personally thank him for his work and to wish him well for the future.

A dedicated and successful worker for half a century, Mr. Nacke spent 34 years at KWS. In the beginning, he spent approx. 11 years each as a simulator instructor and head of Power Plant Shift Supervisor training. From 2003 on, as Head of Training and Deputy Managing Director, he left his mark on our institution and proved to be a good steward even in turbulent times. Under his aegis, training offerings doubled, international activities intensified, cooperation with Paper Maker Schools were launched and various infrastructure and simulator construction projects were conducted.



From left to right: Erland Christensen, Hubertus Altmann, Heinrich Nacke and Ernst Michael Züfle

Following welcoming speeches by his successor, Ernst Michael Züfle, and the Deputy Chairman of the Shop Council, Christian Jaffke, the Chairman of the Board of Directors, Hubertus Altmann, delivered the honorific speech. His words aptly describe Heinrich Nacke's efforts: "Your work always followed one big goal – growth and development of KWS. You identified with it to an extent that could not have made the board of directors happier."

## Project "Marketing & Communication"

The project "Marketing & Communication" is conducted in collaboration with kaiserkom, an agency contracted by KWS, and three operatives from member companies. Project structure includes project management, a permanent project group and a steering committee. The project group consists of six members previously appointed by the team's coordinators. The steering committee is made up of the business management, the division management und the project management. After the launch of the project on April 26<sup>th</sup>, 2016, various measures were taken:

1. Brand narrative/PR movie (concluded)
2. Sales database concept (SDB) (concluded)
3. Installation and implementation SDB (concluded)
4. Webpage concept (concluded)
5. Webpage programming and implementation

### Time schedule and target dates

Sessions from April through December 2016:

- 5 project sessions
- 13 sub-project sessions (internet/SDB)
- 12 steering committee sessions

Overview of measures taken through December 2016:

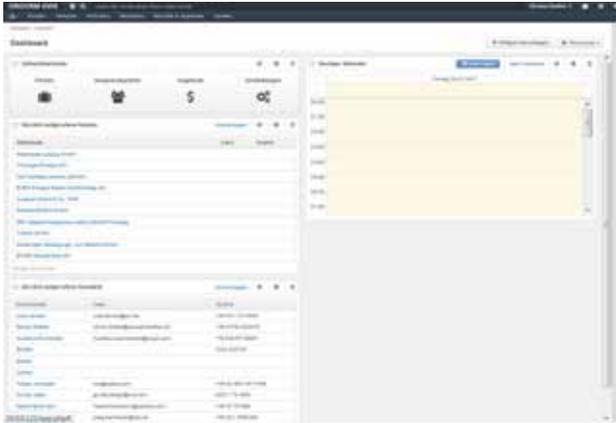
- Brand narrative/PR movie: May – August 2016
- Sales database concept: May – August 2016
- Installation and implementation SDB: July – December 2016
- Webpage concept: May – August 2016
- Webpage programming: July – December 2016

### 1. Brand narrative/PR movie

The development of the brand narrative has been concluded with the production of the PR movie. The use of footage shot during a day at KWS lends the movie authenticity that resulted in a very positive reception by the members of the project group and the KWS staffers. The film was shown during the Member Assembly and has been used on a multitude of occasions.

### 2. Sales database concept and implementation

Following the decision to employ OroCRM as a database at KWS and the introductory phase, the system has been fed data since January 2017. Since it is an "open" system and adaptations are possible with minimum effort, possible prompt changes may be made while the system operates.



Front page sales database OroCRM

### 3. Webpage concept

The webpage concept is based on the so-called customer journey of the visitor. Every visitor's demands on an internet page are different. Some visit the page in search of inspiration while others look for concrete information or want to book a course they have already decided on directly.

#### Archetypes

In order to develop the customer journey of the KWS webpage, the project team first defined the typical KWS-archetypes.

Six archetypes were identified:

- Curious and determined career novice
- Relaxed career novice with desire for recreation
- Midlevel with potential
- Young family man moving up
- Responsible feel good manager
- Ambitious career woman

#### Layout concept

Based on these archetypes, the ad agency has developed the layout concept for the customer journey of the webpage. This concept was introduced during the last project session on August 30, 2016. The webpage has been laid out in a responsive web design meaning that it automatically adapts to the properties of individual end devices (e.g. screen size). It is planned to launch the webpage in three stages in order to be able to see timely results. Stage 1 comprises drawing up and tying in all general information, layout programming and course search with the Typo3 program. The launch of the new webpage is scheduled for March 2017 following the conclusion of this stage.



The new KWS webpage layout

### 4. Outlook/next steps

Coming up for 2017 is the development of marketing campaigns that will intensely use the opportunities provided by the newly conceived webpage and the sales database.

## Inception of the FEREN network for skilled labor retention in the renewable energies industry

On February 22, the founding members of the network signed a cooperation agreement on the premises of KWS PowerTech Training Center (KRAFTWERKSSCHULE E.V. in German) in Essen, Germany. Based on the so-called Skilled Labor Drive initiated by the German Federal Ministry of Labor and Social Affairs, the German Federal Ministry for Economic Affairs and Energy and the German Federal Employment Agency, this network with the German acronym FEREN is designed to make a decisive contribution to skilled personnel retention through appropriate measures.

The Ministry of Labor and Social Affairs' "Skilled Labor for the Region" Innovation Office is assigned to assist and support the network. Plant operators, component manufacturers, service providers and continuing education institutions will jointly develop strategies for qualifications and standards tailored to market demands. Close cooperation between policy makers, employment agencies, existing networks and trade associations is an essential part of this effort. KWS is represented here by Michael Schuhmacher and, together with two other partners, makes up the coordination team within the network. In his welcoming speech, the managing director of KWS, Mr. Ernst Michael Züfle, remarked that KWS' self-concept as both a well-established broadcaster of knowledge and as a meeting place for the national and international power industry makes sure that the school will be a dependable and

competent partner for the network. The keen interest in this initiative became particularly clear on the second day of the event with attendance totaling 54 participants. The representative of Northrhine-Westphalia's Ministry for Economic Affairs, Energy, Industry, Small Businesses and Skilled Crafts and Trades, Mr. H.M. Geßner, emphasized in his address that networks in general and especially on this particular topic may look forward to receiving substantial political support. Lectures held during the event provided participants with insight into the goals of the network, the skilled labor situation in Germany from the point of view of employment agencies and the personnel requirement forecasts in the field of renewable energies on the basis of representative studies. Complementing the event were workshops on the topics of "Continuing Training Development", "Renewable Energies Job Opportunities Information Strategy" and "Labor Market Integration of Immigrants", which met with wide interest and intense debate.

A presentation of the results of the workshops concluded the event. Positive feedback from the participants confirmed the faith of the network's founders in their initiative.

Conducting the event on our premises also gave all attendees the opportunity to appreciate KWS as a competent player in the renewable energies industry.



Representatives of the founding members of the "FEREN" network

## Simulation technology Block unit D, Neurath power plant and Block unit E, Westfalen power plant

### First training use of lignite-fired power plant variant Neurath, block unit D

On October 24<sup>th</sup>, 2016, following extensive development, the training simulator for lignite-fired power plants in its Neurath, block unit D variant, was successfully used for training at the RWE instruction center at Niederaussem for the first time. The simulator is equipped with the original Siemens SPPA-T3000 control engineering automation code for the 600 MW class of this power plant. The simulation model evolved from the virtual startup model. The employment of a more detailed model for firing chamber simulation resulted in a more exact replication of block unit behavior in transient operations. Even though the simulator has not yet been used in its final form, operating crews from the power plant were able to train realistically. Completion is scheduled for 2018. The Neurath block unit D variant complements the existing variants of Niederaussem block unit G (600 MW) and BoA 2/3 (1100 MW) of the KWS simulator for lignite-fueled power plants.



Simulator control room StK-800

### Conversion of the simulator for hard coal-fired power plant from Westfalen block unit D to block unit E

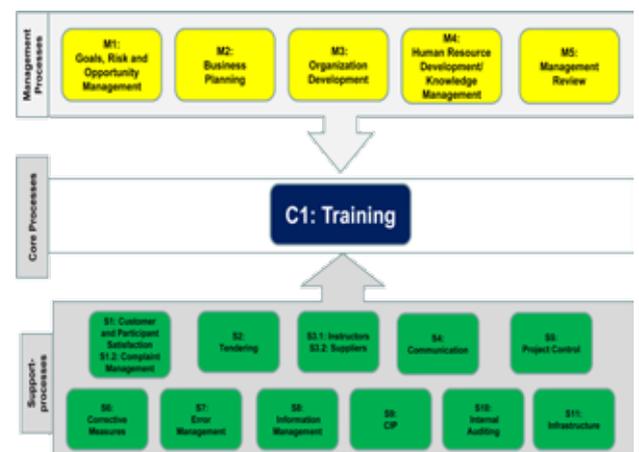
In August 2016, RWE assigned KWS to convert the simulator for hard coal-fired power plants from the Westfalen block unit D variant to block unit E of the same power plant. Following RWE's December 2015 decision to decommission the 800 MW block unit D due to severe damage caused by technical

problems, further development of the simulator and realistic training were no longer required. On-site convoy block unit E, which had been in commercial operations since July 2014 lent itself as a welcome substitute reference plant. The challenges involved in the conversion lie, among other things, in the correct tie-in of several 10,000 control engineering signals with the simulation model as well as in its adaptation to the PPI designation of block unit E and the simulation environment. Conversion efforts commenced with the installation of the original Siemens SPPA-T3000 control engineering automation codes of block unit E on the development platform of the simulator for hard coal-fired power plants. In December 2016, an initial training upload with the updated automation code was made available. Conclusion of the elaborate conversion is scheduled for September 2018.

## Quality management

The DIN ISO 9001:2008 standard was replaced by DIN ISO 9001:2015. Quality management systems must be replaced after a maximum of three years in order to comply with the new standard. Since a number of organizational changes at KWS necessitated a revision of its system, the KWS management decided to conduct the replacement immediately and have it reviewed during the next audit. For that purpose, the system was completely revised.

Five management processes, one core process and 11 support processes were determined, a 45 percent reduction vis-à-vis the existing system with a total of 31 processes. Processes were primarily conceived by KWS's own operatives who will subsequently employ them.



KWS process diagram

The first surveillance audit revealed outstanding results in verification and effectiveness; no deviations or deficiencies were detected. Certification according to DIN ISO 9001:2015 was granted.

## Conversion of ongoing accounting in accounting and finance

In accordance with a board resolution of June 2015, FAS Business Services AG (FAS BS) was assigned with handling ongoing accounting tasks for the purpose of optimizing KWS's work processes through digitization.

All bills and receipts will henceforth be digitized and made available to FAS BS via a workflow also comprising the factual signed after verification.

Document entry, payments, dunning as well as asset accounting and cost accounting will be conducted by FAS, whereas invoicing, digital recognition of bills and receipts as well as their allocation will remain with KWS.

Following extensive preparation including the conversion to a new G/L accounts framework, the system will be installed and initiated in early 2017.

## Best Paper Awards - POWER-GEN Africa



Award ceremony

KWS took part at the PowerGen Africa from July 19 – 21, 2016, as one of the more than 3,000 participants present during this world-renowned power industry event that brings together power plant operators, manufac-

turers and service providers as well as policymakers. In addition to a trade exhibition that prominently featured a KWS information booth, an expert conference was held.

KWS's contribution to this conference was a lecture on the topic "Holistic long-term training project to build capacity for effective operational management of power plants". This contribution, which consisted of a paper and the lecture itself, was selected as one of the three best contributions to the conference and received a „Best Paper Award“.

## Apartment Building



Apartment building of the KWS

The apartment building with its 54 modern furnished apartments of approx. 21 square meters each enables residents to live and study in the immediate neighborhood of KWS's training center.

Generously equipped kitchens on each floor, gyms and leisure areas as well as group study chambers complete with audiovisual equipment round out accommodations on the premises. Spacious outer premises offer plenty of diversion thanks to a variety of leisure time activity options.

An approximately 85 percent occupancy rate for 2016 proves that combining accommodation, relaxation and close proximity to the school is vital for studying at the KWS PowerTech Training Center.

Featuring an innovative energy concept, this architecturally successful object blends in perfectly with its Deilbachtal surroundings and complements the Energy-Campus Deilbachtal.

## KWS Conference Center

The KWS has been offering all members an option of using the training center facilities as a convention center. Convention and seminar rooms are available for up to 150 participants and equipped with all modern media and optional videoconferencing. Meals may be supplied by KWS's on-site restaurant. During the report period, KWS's facilities were booked 307 times by external hosts of seminars or conventions.



Inside view of conference room

## Dismantling 2016

On September 14<sup>th</sup> and 15<sup>th</sup>, 2016, KWS POWERTECH TRAINING CENTER hosted "Dismantling 2016 - Expert convention on nuclear power plant dismantling technology and practice with accompanying exhibition" at the Tullnerfeld Joint Nuclear Power Plant (Zwentendorf) in Austria. It was the second such event after its successful premiere in 2014.

The parameters and effects of the 13<sup>th</sup> amendment of Germany's Atomic Energy Act dated August 2011 are getting increasingly concrete. A mere eight out of 17 nuclear power plants in Germany are currently in power operations. Nine facilities are already in their post-closure phase and have handed in requests for decommissioning and dismantling with the relevant authorities. The first approvals are expected to be granted in 2017 so that actual dismantling measures are launched promptly. In addition, the dismantling of four commercial and various research reactor is progressing. The post-closure phase and subsequent decommissioning

and dismantling are a complex and demanding task both for power industry businesses as well as for manufacturers, service providers, appraisers and the authorities. The key to success here is well-trained personnel. KWS has been addressing this important issue for years and is offering theoretical basic and advanced as well as practical training for stripping, disassembly, handling and conditioning of nuclear power plant components. This results in an excellent combination of theory and practice, which we put into effect at the Zwentendorf nuclear power plant, among other places.

New technical processes and techniques are being employed and offered, businesses are getting better in organizational development and optimum project execution. "Dismantling 2016" offered the opportunity to get information from exhibitors, discuss relevant topics with experts on hand and swap experiences with colleagues from other plants.

The convention took place in the turbine house, on the gallery approx. three meters above the exhibition area. Up there, room had been made for more than 100 visitors attending the event.



Lecture area on the turbine floor of the nuclear power plant

The contents of the various presentations were closely practice-oriented and had been carefully selected from a wide range of suggestions. 17 experts held presentations on subjects like the following:

- Overview of ongoing European dismantling projects in Germany and Europe
- Dismantling planning
- Approval and supervision
- Political developments
- Stripping and disassembly techniques
- Waste material conditioning
- Cost management.



Exhibition area on the turbine floor of the nuclear power plant

Following the convention, visitors and exhibitors were given tours of the nuclear power plant's facilities, another highlight of the event. On both days of the convention, experienced instructors guided three groups each around the installation.

The exhibition took place on the turbine floor. 24 exhibitors presented their products, services and solutions on more than 230 square meters of floor space.

Planning, preparation, organization and implementation of "Dismantling 2016" were in the hands of six KWS staffers who made a significant contribution to the event's success.

KWS expresses its gratitude towards the EVN representatives in charge for their comprehensive assistance, especially Franz Müller, EVN's local person in charge, and tour guides Jürgen Lang and Günther Sauer from the Isar nuclear power plant.

**"Dismantling 2018"** is scheduled for September 2018 at the same location featuring current dismantling topics in the usual practice-oriented manner.



"Dismantling 2016" organizing team



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