

PROGRESS REPORT 2017

KRAFTWERKSSCHULE E.V.
KNOWLEDGE WORKMANSHIP SAFETY



Foreword

The current Progress Report of KRAFTWERKSSCHULE E.V. (KWS PowerTech Training Center) informs members about basic and advanced training events conducted, related activities and projects as well as covering panel work during the report period from January 1, 2017 to December 31, 2017.

Many member companies continue to confront challenges brought about by political decisions affecting the Germany power industry. Gross electricity generation reached a new high at 654 TWh, 62 percent of which originated from fossil and nuclear and approx. 33 percent from renewable energy sources, facilitating an environmentally friendly, affordable and secure electricity supply.

Enrollment in plant attendant, power plant operator and power plant shift supervisor courses was high during the report period. Demand for on-site training measures for individual facility operators continued to increase and was satisfactorily met.

Simulator use for lignite, hard coal and CCGT power plants by our members was less intense overall than in previous years. Lignite and hard coal simulators had been employed for basic training courses during the last few years. Currently, however, simulator use focuses more on consolidation and enhancement courses that are usually shorter in duration. Also, due to the cancellation of the SPPA-T2000 control engineering technology, employment of the CCGT simulator shifted towards its successor, SPPA-T3000. Commencement of on-site simulator training for the Datteln power plant was a very encouraging event in 2017. During the reconfiguration of the 800 MW hard coal simulator, the deadline for the provision of the initial training upload milestone was met. Construction of the 600 MW lignite simulator was successfully concluded, thereby integrating the simulator into training operations.

In nuclear technology seminars, our activities focused on teaching fundamentals, operations management, skill retention and radiation protection.

In the field of renewable energies, courses for wind energy and hydropower installation personnel were conducted. Overall training demand in the area of part-biogenic thermal waste utilization was satisfyingly high.

Various member companies react to market demands by conducting adjustment and optimization measures. KWS accompanies these measures at the plant and the shift crew level with Best Practice Workshops in the areas of social, methodical and personal skill development, for example. Such workshops focused on the workplace behavior of staffers, on teamwork, communication, decision making as well as on control and supervisory activities.

International activities saw exceptionally high capacity utilization. Of particular importance were courses for the operating personnel for recently erected CCGT installations (3 x 4,800 MW) in Egypt, steam generator training for engineers and operating personnel of the Kusile hard coal-fired power plant (6 x 800 MW) in South Africa and further measures in Nigeria, Malaysia, China, Russia and Turkey.

In order to advertise KWS' offerings even better in the future, the "Marketing & Communication" project continues. The new promotional video under the motto "**K**nowledge–**W**orkmanship–**S**afety" is very positively received and so is our homepage with its new modern design.

The second DIN EN ISO 9001:2015 monitoring audit of the quality management system yielded an outstanding result in verification and effectiveness without any deviations from standard or flaws.

In conclusion, we would like to express our heartfelt gratitude for your trust vested in us. Today and tomorrow, we continue to be your competent service provider for basic and advanced training of operating personnel, for organizational counseling and human resource development as well as for the construction and development of power plant simulators.

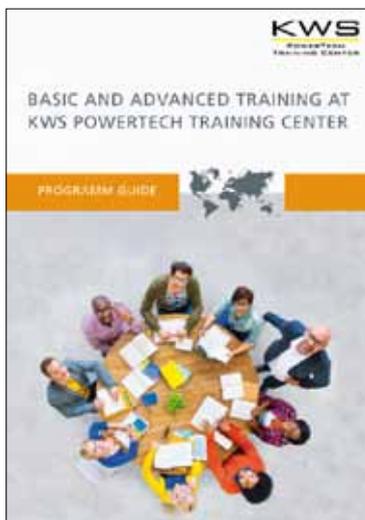


Ernst Michael Züfle
Managing Director

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Program Guide



(QR-Code valid until end of 2018)



Performance in 2017

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 the entire power industry with qualified and certified personnel of the highest order. The wide range of KWS's advanced training offerings enables companies 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. KWS's comprehensive training simulator pool permits offering 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, 2017	Courses conducted	Number of Participants	Number of Participant Days
Conventional Power Plant Technology	92	1.035	28.093
Nuclear Technology/Radiation Protection	43	399	1.577
Simulator Training	95	355	1.433
Organization Development	9	40	53
Renewable Energies	5	28	123
International Activities	60	753	8.360
Total	304	2.610	39.639

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, POWER PLANT SHIFT SUPERVISORS AND CUSTOMER-SPECIFIC ADVANCED TRAINING MEASURES

January 01 – December 31, 2017	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Operators	15	236	9.238
Power Plant Shift Supervisors–Production	15	234	14.052
Power Plant Shift Supervisors– Production Electrical and Control Engineering	6	87	1.820
Advanced Training Measures	34	269	1.677
Customer-Specific Advanced Training Measures	22	209	1.306
Total	92	1.035	28.093

Among others, the following courses were held during the report period:

Plant Attendants

15th training course

Module Basic with 12 participants

Module Steam Generation with 12 participants

Module Turbines with 9 participants

16th training course

Module Basic with 39 participants

Module Dampferzeuger with 38 participants

Module Turbinen with 29 participants

Power Plant Operators

113th training course with 47 participants

114th training course with 18 participants

115th training course with 43 participants

KWS-certified Operator Production for EEW Energy from Waste GmbH

03rd training course with 11 participants

04th training course with 9 participants

Power Plant Operator Training Course for VW Kraftwerk AG

02nd training course

Module I with 15 participants

Module II with 15 participants

Kraftwerksmeister Produktion

133rd training course with 15 participants

134th training course with 28 participants

Kraftwerksmeister Elektrotechnik/Leittechnik

134th training course with 6 participants

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, 2017	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Shift Supervisors– Radiation Protection	3	10	280
Nuclear Basics	1	6	420
Skill Retention	19	186	186
Skill Acquisition in Radiation Protection	1	4	96
Advanced Training Measures in Radiation Protection	5	7	96
Customized Measures	14	186	499
Total	43	399	1.577

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, 2017	Trainings conducted	Number of Participants	Number of Participant Days
Hard Coal/Lignite/Gas/Oil 300 MW (FOKS)	6	21	75
Lignite 600/1100 MW	29	99	451
Hard Coal 800 MW	35	134	416
Hard Coal 1100 MW	10	52	260
CCGT 750-S/D (SPPA-T2000)	5	13	78
CCGT 750-3 (SPPA-T3000)	10	36	153
Total	95	355	1.433

Construction Committee “Simulator for Lignite-Fired Power Plants”

The committee was set up for the purpose of realizing the simulator for lignite-fired power plants in order to assist KWS in the implementation of the simulator construction project. Since the commissioning of the simulator, the committee has been counseling KWS on the evolution of the different simulator variants.

The committee convened twice during the report period:

March 9th, 2017

September 4th, 2017

The Construction Committee concerned itself with the following topics:

- Commissioning of the new simulator variant Neurath power plant block unit D, 600 MW,
- Upgrade of the automation code of the Niederaußem power plant block unit G, 600 MW variant to the current state of reference plant development
- Upgrade of the simulator to the current power plant control engineering system SPPA- T3000 Cue.

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.

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

January 01–December 31, 2017	Courses conducted	Number of Participants	Number of Participant Days
Organization Development	9	40	53

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 comprehensive range of training measures, 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 operations such as Plant Attendant training.

The use of hydropower plants has a long tradition in Germany and Austria. 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, 2017	Courses conducted	Number of Participants	Number of Participant Days
Renewable Energies	5	28	123

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 China, Egypt, Malaysia, Nigeria, Saudi Arabia, South Africa and Turkey as well as in various European countries.

NUMBER OF PARTICIPANTS, COURSES CONDUCTED, MEASURES AND PARTICIPANT DAYS: INTERNATIONAL ACTIVITIES

January 01 – December 31, 2017	Courses conducted	Number of Participants	Number of Participant Days
International Activities	60	753	8.360



The lobby of
"Egypt Electricity Holding Company Talkha Power Plant Training Center"



© Siemens AG
3D sketch sample for CCGT power plants Burullus, New Capital and Beni Suef

Organization

Board of Directors

According to the statutes of KWS, KWS's Board of Directors implements resolutions made by the General Assembly and is obligated to do anything that is beneficial to the goals of the association. Its main tasks are the issue of the annual Progress Report, approval of annual accounts, preparation of the General 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 twice during the report period:

91st meeting March 24th, 2017

92nd meeting June 28th, 2017

Altmann, Hubertus, (Chairman)
Member of the Board of Directors
of Lausitz Energie Kraftwerke AG/
of Lausitz Energie Bergbau AG, Cottbus/Germany

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

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

Müller, Karl-Heinz
Member of the Management of
EEW Energy from Waste GmbH, Helmstedt/Germany
(from September 2017)

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
(to September 2017)

Vermeyen, Raf
Managing Director of ENGIE

Winkel, Erwin
Member of the Board of Directors
of RWE Generation SE/of RWE Power AG, Cologne/Germany

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 2016, the review of operation including the attachment and recommended that the board approve KWS's financial statement for 2016 as is. Consultation of the economic, investment and financial plans for the business year 2018 was carried out by the Financial and Legal Committee. It recommended to the board that it submit them in the General Assembly in 2017.

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 ongoing consolidation measures.

The following activities took place during the report period:

58th meeting April 26th, 2017

59th meeting September 20th, 2017

Eck, Jens, Dr. (Chairman)
Lausitz Energie Kraftwerke AG/
Lausitz Energie Bergbau AG, Cottbus/Germany

Berger, Markus
Uniper Kraftwerke GmbH, Düsseldorf/Germany
(to June 2017)

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

Strehlau, Gabriele
Head of Accounting and Finances Department,
RWE Power AG, Essen/Germany

Wachter, Klaus
EnBW Energie AG, Stuttgart/Germany

Walth, Sébastien
Uniper Kraftwerke GmbH, Düsseldorf/Germany
(from June 2017)

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 135th and 136th Power Plant Shift Supervisor – Production training course and those of the 48th 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:

127th meeting July 13th, 2017

128th meeting December 14th, 2017

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, Neurath Power Plant, Grevenbroich/Germany
(to March 2017)

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

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

Hark, Guido
RWE Power AG, Eschweiler/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 Industry and Commerce, Essen/Germany/

Schletter, Gert
Lausitz Energie Kraftwerke AG,
Jänschwalde Power Plant, Peitz/Germany

Schuknecht, Michael, Dr.
TÜV Nord Systems GmbH & Co KG, Essen/Germany

Wiegel, Michael
RWE Power AG, Gersteinwerk Power Plant, 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.

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".

Ordinary Members

3M Deutschland GmbH, Wuppertal

Abfallwirtschaftsbetrieb des Landkreises Neu-Ulm, Weißenhorn

Abfallwirtschaftsgesellschaft mbH Wuppertal, Wuppertal

AGR Betriebsführung GmbH, Herten

Ahlstrom-Munksjö Paper GmbH, Aalen

AllessaChemie GmbH, Werk Cassella-Offenbach, Frankfurt

AMK Abfallentsorgungsgesellschaft des Märkischen Kreises mbH, Iserlohn

AVEA Entsorgungsbetriebe GmbH & Co. KG, Leverkusen

AVG Abfallentsorgungs- und Verwertungsgesellschaft Köln mbH, Cologne

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

Biopower SKW GmbH, Eberhardszell

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

DSM Nutritional Products GmbH, Grenzach-Wyhlen

DS Smith Paper Deutschland GmbH, Aschaffenburg

DS Smith Paper Deutschland GmbH, Witzenhausen

EBE Holzheizkraftwerk GmbH, Emlichheim

EDF LUMINUS N.V., Centrale Ringvaart, Ghent/Belgium

EDF S.A. – SCAN FOURNISSEURS, Paris-Clamart/France

EEW Energy from Waste Helmstedt GmbH, Helmstedt

Egger Holzwerkstoffe Brilon GmbH & Co. KG, Brilon

EGK Entsorgungsgesellschaft Krefeld GmbH & Co. KG, Krefeld

Electrabel NV/SA, Brussels/Belgium

EnBW Energie Baden-Württemberg AG, Stuttgart

EnBW Kernkraft GmbH, Obrigheim

Energie AG Oberösterreich Kraftwerke GmbH, Linz/Austria

Energie Anlage Bernburg GmbH, Bernburg

Energie und Wasser Potsdam GmbH, Potsdam

Energieservice Westfalen Weser GmbH, Kirchlegern

EnergieSaarLorLux AG, Heizkraftwerk Römerbrücke, Saarbrücken

Energieversorgung Oberhausen AG, Oberhausen

Energieversorgung Offenbach AG

(MHKW Offenbach und HKW Offenbach), Offenbach

Enertec Hameln GmbH, Hameln

ENGIE Energie Nederland N.V., Zwolle/Netherlands

ENGIE Kraftwerk Farge GmbH & Co. KGaA, Bremen

ENGIE Kraftwerk Zolling GmbH & Co. KGaA, Zolling

ERZ Entsorgung + Recycling Zürich, Zürich/Switzerland

Erlanger Stadtwerke AG, Erlangen

Essity Operations Mannheim GmbH, Mannheim

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

EVN AG, Maria Enzersdorf/Austria

Evonik Industries AG, Marl

Evonik Industries AG, Worms

FES Frankfurter Entsorgungs- und Service GmbH, Frankfurt

Freudenberg Service KG, Weinheim

Fernwärme Ulm GmbH, Ulm

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

Gemeinschaftskraftwerk Bergkamen A OHG, Bergkamen	MAINOVA AG, Frankfurt am Main
Gemeinschaftskraftwerk Grohnde GmbH & Co. OHG, Emmerthal	Mark-E AG, Hagen
Gemeinschaftskraftwerk Schweinfurt GmbH, Schweinfurt	Merck KGaA, Darmstadt
Gemeinschafts-Müllverbrennungsanlage Niederrhein GmbH, Oberhausen	MHB Hamm Betriebsführungsgesellschaft mbH, Hamm
GfA Gemeinsames Kommunalunternehmen für Abfallwirtschaft, Olching	MIBRAG Mitteldeutsche Braunkohlegesellschaft mbH, Zeitz
Grosskraftwerk Mannheim AG, Mannheim	Mohn media Mohndruck GmbH, Gütersloh
	Moritz J. Weig GmbH & Co. KG, Mayen
	Müllheizkraftwerk Kassel GmbH, Kassel
	Müllheizkraftwerk Rothensee GmbH, Magdeburg
Hamburger Hungária Kft., Dunaújváros/Hungary	Müllverbrennung Kiel GmbH & Co. KG, Kiel
Hamburger Stadtentwässerung AöR, Hamburg	Müllverbrennungsanlage Bielefeld-Herford GmbH, Bielefeld
HEB GmbH, Hagener Entsorgungsbetrieb, Hagen	Münchener Stadtentwässerung, Munich
Helmstedter Revier GmbH, Kraftwerk Buschhaus, Büddenstedt	MVV Umwelt O&M GmbH, Mannheim
Heizkraftwerksgesellschaft Cottbus mbH, Cottbus	
Heizkraftwerk Pfaffenwald der Universität Stuttgart, Stuttgart	N-ERGIE Aktiengesellschaft, Nürnberg
Heizkraftwerk Pforzheim GmbH, Pforzheim	NOMAC, Jeddah/Saudi Arabia
Heizkraftwerk Würzburg GmbH, Würzburg	Norske Skog Bruck GmbH, Bruck/Austria
Henkel AG & Co. KGaA, Düsseldorf	
HIM GmbH, Biebesheim	OMV Refining & Marketing GmbH, Vienna/Austria
Huntsman P&A Germany GmbH, Duisburg	Oxea Produktions GmbH, Werk Ruhr Chemie, Oberhausen
IHKW Industrieheizkraftwerk Andernach GmbH, Andernach	Papierfabrik Julius Schulte Söhne GmbH & Co. KG, Düsseldorf
InfraServ GmbH & Co. Gendorf KG, Burgkirchen	Papierfabrik Palm GmbH & Co. KG, Wörth
InfraServ GmbH & Co. Höchst KG, Frankfurt am Main	Pfeifer Holz Lauterbach GmbH, Lauterbach
InfraServ GmbH & Co. Wiesbaden KG, Wiesbaden	Phönix Operation and Maintenance Company LLG, Oman/Oman
IWB, Basel/Switzerland	PreussenElektra GmbH, Hannover
Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH (JEN), Jülich	Rabigh Arabian Water & Electric Company, Rabigh City/Saudi Arabia
	RAG Anthrazit Ibbenbüren GmbH, Ibbenbüren
K + S Kali GmbH, Werk Neuhoof-Ellers	Raubling Papier GmbH, Raubling
K + S Kali GmbH, Philippsthal	REMONDIS Thermische Abfallverwertung GmbH, Staßfurt
Kabel Premium Pulp & Paper GmbH, Hagen	R.D.M. Arnsberg GmbH, Arnsberg
Kämmerer Energie GmbH, Osnabrück	RheinEnergie AG, Cologne
Kernkraftwerk Gösgen-Däniken AG, Däniken/Switzerland	Rhodia Acetow GmbH, Freiburg
Knapsack Power GmbH & Co. KG, Düsseldorf	RKB Raffinerie-Kraftwerks-Betriebs GmbH, Leuna
KNG Kraftwerks- und Netzgesellschaft mbH, Rostock	RWE Generation – NL B.V., Geertruidenberg/Netherlands
	RWE Generation UK PLC, Didcot B CCGT Power Station, Oxfordshire/Great Britain
	RWE Generation SE, Essen
Kraftwerke Mainz-Wiesbaden AG, Mainz	
Kraftwerk Mehrum GmbH, Hohenhameln	Salzburg AG, Salzburg/Austria
Kraftwerk Obernburg GmbH, Obernburg	Salzgitter Flachstahl GmbH, Salzgitter
Kraftwerk Schwedt GmbH + CO. KG, Schwedt	Sappi Alfeld AG, Alfeld
Kreis Weseler Abfallgemeinschaft mbH & Co. KG, Kamp-Lintfort	Sappi Austria Produktions-GmbH & Co. KG, Werk Gratkorn, Gratkorn/Austria
	Sappi Ehingen GmbH, Ehingen
Langerlo N.V., Genk/Belgium	
Lausitz Energie Kraftwerke AG, Cottbus	
Linz Strom GmbH für Energieerzeugung, -verteilung und Telekommunikation, Linz/Austria	

Schluchseewerk AG, Laufenburg
 SchwörerHaus KG, Hohenstein
 Solvay Chemicals GmbH, Rheinberg
 Sonae Arauco Beeskow GmbH, Berlin
 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 Hannover AG, Hanover
 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
 SWB Energie- und Wasserversorgung Bonn/Rhein-Sieg GmbH,
 Bonn
 swb Entsorgung GmbH, Müllheizwerk Bremen, Bremen
 swb Erzeugung GmbH & Co. KG, Bremen
 SWM Services GmbH, Munich
 SWN Stadtwerke Neumünster GmbH, Neumünster

Technische Betriebe Solingen (TBS), Solingen
 Thüringer Energie AG, Erfurt
 Thyssen Krupp Steel Europe AG, Duisburg
 T Power Site, Tessenderlo/Belgium
 TWL Technische Werke Ludwigshafen AG, Ludwigshafen

Uniper Benelux N.V., Rotterdam/Netherlands
 Uniper Kraftwerke GmbH, Hanover
 UPM-Kymmene Austria GmbH, Steyrermühl/Austria

Vattenfall Europe New Energy Services 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
 Veolia Industriepark Deutschland GmbH, Heinsberg
 VERBUND Hydro Power GmbH, Vienna/Austria
 VERBUND Thermal Power GmbH & Co. KG,
 Neudorf ob Wildon/Austria
 Vera Klärschlammverbrennung GmbH, Hamburg
 voestalpine Stahl GmbH, Linz/Austria
 VSE AG, Saarbrücken
 Vulkan Energiewirtschaft Oderbrücke GmbH, Eisenhüttenstadt
 VW Kraftwerk GmbH, Wolfsburg

Wels Strom GmbH, Wels/Austria
 Wien Energie GmbH, Vienna/Austria
 WSW Energie & Wasser AG, Wuppertal
 WUPPERVERBAND, Wuppertal

ZAK Energie GmbH, Kempten
 Zanders GmbH, Bergisch-Gladbach
 Zweckverband Abfallverwertung Südostbayern, Burgkirchen
 Zweckverband Abfallwirtschaft Saale-Orla, Pößneck
 Zweckverband für Abfallwirtschaft in Nordwest-Oberfranken,
 Dörfles-Esbach
 Zweckverband für Abfallwirtschaft Südwestthüringen (ZAST),
 Zehla-Mehlis
 Zweckverband Müllheizkraftwerk Stadt und Landkreis Bamberg,
 Bamberg
 Zweckverband Müllverwertung Schwandorf, Schwandorf
 Zweckverband Müllverwertungsanlage, Ingolstadt
 Zweckverband Restmüllheizkraftwerk Böblingen (RBB), Böblingen

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
 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
 AWARDBRAND Limited,
 Chelsea Harbour London/Great Britain
 Carl Duisberg Centren, Cologne
 DURAG process & systems technology GmbH, Hamburg
 Hans Eichner GmbH & Co. KG, Bergheim
 EWEX-ENGINEERING GMBH & CO. KG, Ratingen
 Holter Regelarmaturen GmbH & Co. KG, Holte-Stutenbrock
 INP International Projects-Engineering & Services,
 Johannesburg/South Africa
 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/Austria
 Siemens AG, Erlangen
 Siemens AG, Essen
 Standardkessel Baumgarte GmbH, Bielefeld
 S.T.E.P. Consulting GmbH, Aachen
 Uniper Anlagenservice GmbH, Gelsenkirchen
 Westinghouse Electric Germany GmbH, Mannheim

Membership Development

On December 31st, 2017, the KRAFTWERKSSCHULE E.V. had 230 members, 201 of which were ordinary, eight were affiliated and 21 were sponsoring members.

Three companies joined KWS as ordinary members and one as sponsoring member during the report period.

No member left KWS.

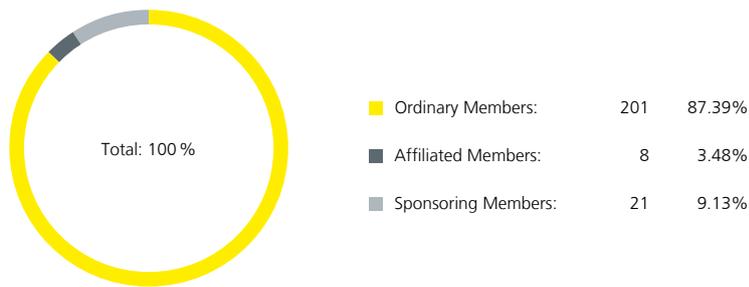
Using the maximum continuous steam performance calculations to assess the contributions of all ordinary member companies in the reporting year the total performance was 360.882 t/h.

34 member companies are based outside of Germany, namely:

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

The continuous steam performance of the foreign member companies adds up to 39.697 t/h or approximately 11 % of the total amount of all ordinary members.

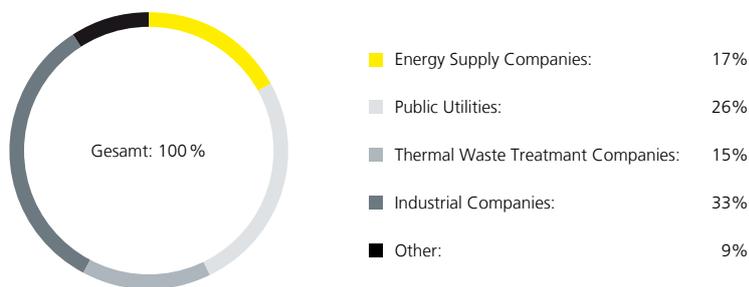
MEMBERS



Listing of all members (As at December 31st, 2017)

Fig. 1

COMPOSITION OF THE GROUP OF ORDINARY MEMBERS



Listing of all ordinary members (As at December 31st, 2017)

Fig. 2

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	41	20,40	1.796,08	0,50
101–500 t/h	88	43,77	22.451,04	6,22
501–1.000 t/h	18	8,96	12.522,73	3,47
above 1.000 t/h	54	26,87	324.112,63	89,81
Total	201	100,00	360.882,48	100,00

KWS in General

60 Years of KWS

In 1957, KRAFTWERKSSCHULE E.V. (KWS PowerTech Training Center) commenced its activities in the form of a "Power Plant Shift Supervisor Training" task force, launching a success story in the field of basic and advanced training of power plant and energy installation personnel. In 2017, KWS commemorated its 60th anniversary.

Common values, goals and projects as well as the personal commitment of so many staffers from member companies, from KWS and supporters from other institutions have made KWS a modern, up-to-the-minute educational establishment. It always has been and continues to be its aspiration to permanently implement the latest developments in power plant and energy technology as well as operations management in timely training concepts, thereby making a contribution to a secure, environmentally friendly and affordable energy supply. Knowledge–Workmanship–Safety for the benefit of staffers in coal-fired power plants, nuclear power plants, gas-fired power plants, renewable energy installations, thermal waste utilization power plants, industrial power plants and more—that is KWS' motto and its passion.

Simulation Technology: Neurath Power Plant, Block Unit D and Westfalen Power Plant, Block Unit E

Completion of lignite simulator variant Neurath power plant, block unit D

In mid-2017, the training simulator for lignite-fired power plants designed for block unit D of the Neurath power plant was completed. This unit had first been employed in basic training at the RWE training center at Niederaußem, Germany, beginning in October 2016. In May, June and August 2017, trial runs were conducted jointly in collaboration with an RWE test group composed of staffers from block unit D of the Neurath power plant. A variety of startup and shutdown procedures were successfully rehearsed, the correct sequence of load limit scenarios was checked and block unit modes of operation planned for immersion instruction were verified. The results achieved found the approval of the test group so that the new variant could be installed on the instruction platform in Niederaußem and be used for immersion training. This project is now completed. The simulator variant's further evolution will be part of KWS' regular model upgrades.

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

The conversion of the Westfalen hard coal power plant simulator from block unit D to block unit E ordered by RWE continues to progress. The greatest challenges of the conversion involve the correct integration of several 10,000 control technology signals into the simulation model as well as the modification of the simulation environment. An initial training upload was made available as early as 2016, while an improved training upload was installed on both KWS training platforms in 2017 and employed for instruction measures. In parallel with training, the project's completion, which is scheduled for September 2018, is moving ahead.

Capacity Building India

Initiated by the Indo German Energy Forum (IGEF), KRAFTWERKSSCHULE E.V. (KWS PowerTech Training Center) was assigned to conduct the "Required Training for Flexible Operation of Coal Fired Power Plants in India" study (project # 15.9040.5-003.00) by Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ).

India's renewable power generation capacity has seen an increase to a 16 percent share within the last ten years, more than double than what it was a decade ago. It is the goal of the Indian government to install a capacity of 175 GW of renewable energy by the end of 2022. Power generation from solar and wind energy is characterized by volatility and limited predictability. Thanks to a multitude of measures like, for example, energy storage, grid expansion, demand control and flexible operations, India's power supply system will be enabled to counteract negative effects on grid stability and service security in the future. The flexibility option represents the most important short-term implementation countermeasure. Flexibility means higher load change speed, quicker startup and shutdown as well as decreased minimum load without support firing. Due to its inherent higher fuel and life cycle consumption, this mode of operations will entail additional operating cost.

The "Capacity Building" study concerns itself with the conception and execution of client-specific training and qualifying measures for Indian power plant personnel. The recommended training plan consists of prep, flexibility, simulator and competency modules covering a wide range of technical topics for all variants of coal-fired power plant layouts. During the training phase, each participant's performance and progress are being evaluated and verified. Selective training enables participants

to apply knowledge and skills acquired in theory and practice in an active and purposeful manner under expected operating conditions and in their new field of activity. Graduation exams complete with confirmations of participation and certificates document training success and assist personnel development in India's power industry. The training program conceived strictly complies with all workplace safety and environmental protection standards while observing client-specific demands in the areas of operations, planning and maintenance.

The power plant and grid simulator represents a complementary training module. Training simulators should be based on the technical data of the actual power plants and grids they reproduce. Modularized simulator instruction enables different target groups like management, operating and maintenance personnel to familiarize themselves with specific scenarios on the grid and power plant level and their resultant interaction. "Train and Instruct the Trainer" will be a significant part of the competency module in order to prepare the Indian instructors for the future challenges of the power market during the transition phase. Following the completion of its training, this particular target group may serve as multipliers for comprehensive, nationwide training measures under a superordinate Indian coordination agency.

Excerpts of the results of this study have been published in international trade papers and were presented at various conventions.

Siemens and KWS Collaborate to Train Egyptian Power Plant Personnel

In cooperation with its local partners, the Egyptian Ministry of Electricity and Renewable Energy and the Egypt Electricity Holding Company (EEHC), Siemens AG is building three CCGT (=Combined-Cycle Gas Turbine) power plants in Egypt, located at Beni Suef, Burullus and New Capital. The new natural gas-fueled plants will possess an overall electrical capacity of 14.4 gigawatts, 4.4 gigawatts of which will be connected to the national grid a mere 19 months after the signing of the contract between Siemens and its clients. This is a record-breaking six months quicker than any previous project worldwide.

Of course, even advanced power plants like these, equipped with state-of-the-art control and systems engineering technology, are only as efficient as the people who manage, operate, and service them. Therefore, thoroughly and comprehensively instructing local experts and skilled professionals in their future assignments at the plant is a core building block, especially in a project of this magnitude.

The first step of the project was finding the proper operating

personnel. The individuals destined to become power plant operatives at Beni Suef, Burullus and New Capital were carefully chosen from a large number of suitable applicants following an exacting selection process. Devised by Siemens in close cooperation with the Egyptian Ministry of Electricity and Renewable Energy and the Egypt Electricity Holding Company, the recruitment standards applied focused on academic prowess, English language proficiency and existing power plant-related knowledge and skills of the candidates. At the end of this process, some 600 Egyptian engineers and technicians who will make up the new plants' personnel had been hand-picked. The trainees commenced their six-month training schedule on April 3rd, 2016. Training groups comprise all technical areas of the power plants from operations management to maintenance. Being a seasoned builder of power plants, Siemens conducts any plant-specific systems and component training on its own. However, as a long-term member of the registered association of KRAFTWERKSSCHULE E.V. (KWS PowerTech Training Center), Siemens has chosen to use the school's proven expertise to help establish a common foundation of technical skills for all trainees, laying the groundwork for their follow-up plant-specific instruction.



Beni Suef

For all 600 trainees, instruction begins with eight weeks of so-called foundation training (language, soft skills, technology) irrespective of their future assignments, be it as managers or technicians in operations or maintenance. KWS has been tasked with developing and conducting the three-week "Fundamental Technical Training". Nine of these "Fundamental Technical Trainings" took place in 2016 and 16 in 2017.

The trainees' professional and/or academic backgrounds are quite heterogeneous. The future operations managers of the three new power plants, for example, already possess significant practical experience, therefore the "Fundamental

Technical Training” course is designed to preserve and, if necessary, update their existing skills and knowledge. Operations technicians, on the other hand, are mostly college graduates with degrees in mechanical and electrical engineering, but no hands-on experience in running a power plant. In their case, fundamental technical training enables them to acquire the know-how needed for their upcoming duties. The same diversity of backgrounds applies to individuals chosen to become maintenance managers and technicians.

“Fundamental Technical Training” contents are based on the curricula for plant attendant instruction, covering the layout and operations of steam generators as well as gas and steam turbines in large power plants.

The 3-week course is subdivided into three one-week training modules:

1st week, module 1

Day 1/2: Thermodynamics

Day 3: Fluid Dynamics

Day 4/5: Auxiliary Systems

2nd week, module 2

Day 1: Electrical Basics

Day 2: Electrical Components & Supplies

Day 3: Basics of C & I

Day 4: Basics of Measurements

Day 5: Basics of Control Loops in Power Plants

3rd week, module 3

Day 1: PID/Overview of a CCGT

Day 2: Gas Turbine

Day 3: Heat Recovery Steam Generator

Day 4: Steam Turbine

Day 5: Condenser/Cooling System

All topics covered in these modules provide indispensable information to anyone involved in power plant operations and maintenance. Successful completion of this training measure puts all participants on an equal footing with regard to their understanding of power plant processes.

“Fundamental Technical Training” is theoretical in nature and was conducted in the classroom by six experienced KWS teachers. The business language was English throughout the entire training schedule. Instruction took place in Egypt at various EEHC locations:

Operations management personnel was gathered from all three locations and trains either at EEHC headquarters in Cairo or at the North Cairo Power Station Training Center.

Future operations technicians of the New Capital CCGT plant

use the North Cairo Power Station Training Center for their schooling. Operations technicians assigned to the Burullus CCGT plant train at EEHC’s Talkha Power Plant Training Center, whereas Beni Suf operations technicians receive their instruction at the EEHC Koraymat Training Center.

KWS also assisted Siemens in the plant-specific “Basic Operational Training”. Here, 3-10-day training events were conducted by seasoned KWS instructors focusing on electro-technology, control engineering technology, gas turbines, steam turbine and the water-steam cycle.

All in all, some 42 courses (568 course-days) for 584 participants (6836 participant-days) were conducted in Egypt in 2017.

Empower Refugees

In 2016, the FEREN network designed to safeguard the supply of skilled labor in the field of renewable energies was founded on the premises of KWS. Given the acute shortage of skilled personnel, one of the most essential goals of the network’s efforts even at that time was the integration of immigrants into the labor force through qualifying measures tailored to market needs. In cooperation with the partners in the networks, a possible framework for implementing such measures was worked out and substantiated by KWS in the umbrella project “Empower Refugees”.

Its primary goal is to qualify participants for the officially approved occupation of “Industrial Electrician Operations Technology (CIC) for Wind Power”. Constraints applying to the particular target group (language and cultural barriers) are given special attention through the employment of social workers during the training process, for example.

At the onset, target group approach and participant acquisition options as well as funding for the project needed to be worked out. An intense dialog with representatives from Northrhine-Westphalian state ministries, the MEO regional agency (Mülheim a. d. Ruhr, Essen, Oberhausen) and the communal JobCenter of the city of Essen, outlined possible implementation alternatives. Since the target group is funded in accordance with Germany’s Social Security Code, specific rules and regulations for labor market measures apply. Basic and advanced training institutions may only conduct such measures provided they prove their capability and reliability, employ qualified personnel and a quality control system, among other things. These provisions need to be certified in compliance with AZAV, Germany’s accrediting and licensing ordinance. AZAV regulates the recognition (accreditation) and license (certification) of instruction institutions and measures through independent organizations and is detailed

in the German Social Security Code III. Available labor market measures are subdivided into different sections. The KWS project has been assigned to Section 1 "Activation and Professional Integration" and Section 4 "Advanced Vocational Training". The certification procedure comprises several stages.

Stage 1 requires applying for a binding "Agency License", which KWS' Renewable Energies department received on October 17th, 2017. Certifications required for individual measures governed by Section 4 have been applied for.

The actual implementation of the project is scheduled to begin in March 2018 with a five-month basic skills training measure covering electrotechnology. The 16-month retraining for the certified occupation described above is to be conducted beginning in August 2018.

Several companies from the wind power industry have declared early on their readiness to participate in the project. Besides the willingness to provide the necessary internship openings, they have signed declarations of intent expressing their commitment to hire. All in all, these companies want to employ more than 20 graduates of the project permanently following the successful completion of their vocational training exam. This very good and concrete perspective gives training participants additional security and motivation.

Due to great demand from both the wind energy industry and immigrants, it is intended to conduct such measures at KWS recurrently. In addition, such measures may also be offered in other German states in cooperation with certified regional and local training agencies.

Projekt „Marketing & Kommunikation“

The "Marketing & Communication" project is conducted in cooperation with the marketing agency assigned by KWS and staffers from member companies. The project is structured by a project head, a standing project group and a steering committee. The project group consists of six members previously appointed by the team's coordinators. The steering committee consists of the management, the department head and the project head.

After launching the project on April 26th, 2016, further measures were conducted in 2017:

1. Relaunch of webpage (concluded)
2. Conception and relaunch of international webpage (concluded)
3. Introduction of sales database (VDB) (concluded)
4. Marketing measure "Skill Retention" (concluded)
5. Marketing measure "Renewable Energies"

Schedule and dates

Sessions that took place from January to December 2017:

- 8 project sessions
- 6 partial project sessions (internet/VDB/marketing measures)
- 4 steering committee sessions

Measures overview through December 2017:

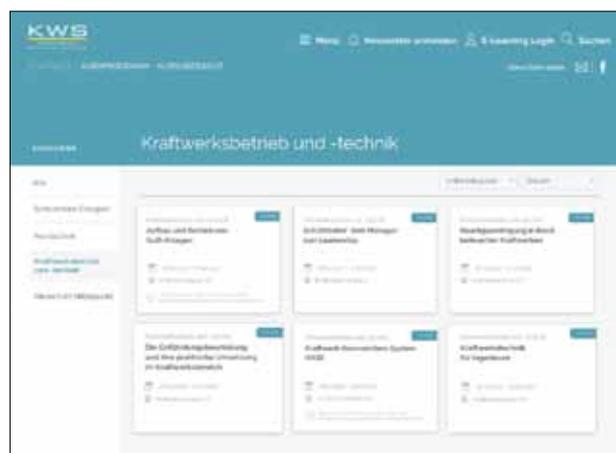
- Relaunch of new webpage: March 2017
- Conception and relaunch of international webpage: March–August 2017
- Introduction VDB: November 2017
- Marketing measure "Skill Retention": August 2017

1. Relaunch of webpage



Auswahl einschränken			
Titel	Datum	ID	
Kraftwerksbetrieb und -technik Arbeiten an Gasanlagen / Basismodul für "Befähigte Personen" für Arbeiten an Gasan- lagen	27.11.2017 – 28.11.2017	45077609304 (behalten 100-0)	
Kraftwerksbetrieb und -technik Arbeiten an Gasanlagen Gesamtlehrgang für "Befähigte Personen" für Arbeiten an Gasan- lagen	27.11.2017 – 01.12.2017	45077609301 (behalten 100-0)	

Previous course overview



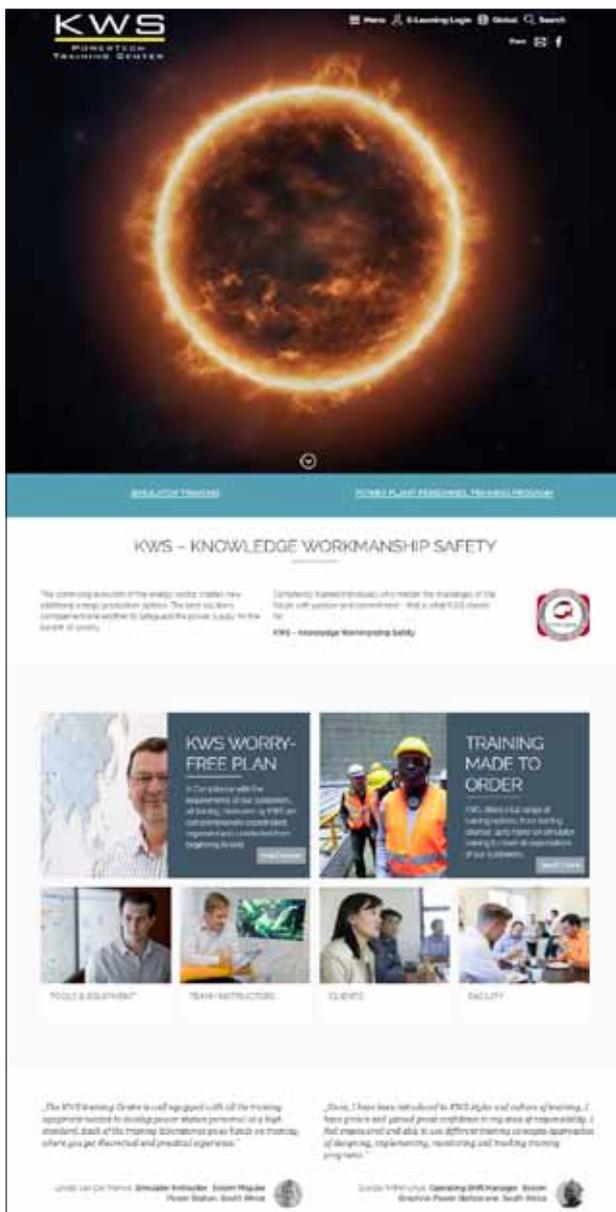
Kraftwerksbetrieb und -technik			
Titel	Datum	ID	
Kraftwerksbetrieb und -technik Arbeiten an Gasanlagen / Basismodul für "Befähigte Personen" für Arbeiten an Gasan- lagen	27.11.2017 – 28.11.2017	45077609304 (behalten 100-0)	
Kraftwerksbetrieb und -technik Arbeiten an Gasanlagen Gesamtlehrgang für "Befähigte Personen" für Arbeiten an Gasan- lagen	27.11.2017 – 01.12.2017	45077609301 (behalten 100-0)	

Suggested new course overview

In early March of 2017, the new KWS webpage went online. With the incorporation of all existing information, the programming of the layout and the course search function, the initial phase of the relaunch is now concluded. Since the webpage will

be a crucial part of KWS' marketing strategy, analysis software was utilized following the relaunch in order to observe the development of the webpage. During this phase, visits to the webpage were analyzed and further optimization measures for the site were subsequently derived based on the evaluations.

2. Conception and relaunch of international webpage



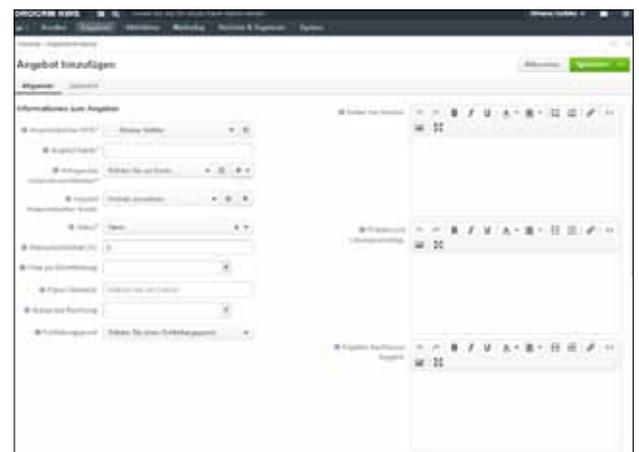
Homepage KWS International

The international webpage should not require the traditional switch between two language versions. Instead, a unique page based on the international course program should be created. The design and structure of the webpage borrows

from KWS' "standard" site, but displays no concrete course offerings. In its place, it presents the work and the flexible concept of our "International Activities" team, just like the hardcopy course program

3. Introduction of sales database

Following the decision and implementation to use Oro CRM as a sales database at KWS, the system was uploaded with customer data beginning in January 2017. In order to permit KWS staffers easy access to working with the database, several user instruction measures were conducted. Feedback from the colleagues taking part in the training has prompted further modifications designed to improve the system's user friendliness. Also, it became necessary to incorporate offer tracking from KWS' quality management system into the database. The alterations required were carried out so that the system could be initiated in early November 2017.



Offer tracking

4. Marketing measure "Skill Retention"

In 2017, KWS developed a modularized training course concept for the topic "Skill Retention". A DIN A5 brochure and an underpage, a so-called landing page for the web page were devised for this concept as a marketing measure. The landing page features analysis software that enables tracking reactions to this measure.

The brochures were mailed to our customers and the landing page on the KWS internet page was initiated.

KRAFTWERKE WIRTSCHAFTLICH UND SICHER BETRIEBEN MIT KOMPETENZ.

SEMINARREIHE ZUM FACHKUNDEERHALT FÜR SCHICHTPERSONAL

Zielsetzt für Fachpersonal:
Die Teilnahme an dieser Seminarreihe garantiert Ihnen ein hohes Maß an Kompetenz und Sicherheit im Betrieb. Sie erhalten die neuesten Informationen über die neuesten Technologien und Verfahren im Kraftwerk. Die Seminarreihe ist für das Fachpersonal der Schichtbetriebe im Kraftwerk konzipiert. Sie erhalten die neuesten Informationen über die neuesten Technologien und Verfahren im Kraftwerk. Die Seminarreihe ist für das Fachpersonal der Schichtbetriebe im Kraftwerk konzipiert.

Planungsprinzipien, Verfahren und Verfahren:
Die Seminarreihe ist für das Fachpersonal der Schichtbetriebe im Kraftwerk konzipiert. Sie erhalten die neuesten Informationen über die neuesten Technologien und Verfahren im Kraftwerk. Die Seminarreihe ist für das Fachpersonal der Schichtbetriebe im Kraftwerk konzipiert.

Die Vorteile der Reihe:
Die Teilnahme an dieser Seminarreihe garantiert Ihnen ein hohes Maß an Kompetenz und Sicherheit im Betrieb. Sie erhalten die neuesten Informationen über die neuesten Technologien und Verfahren im Kraftwerk. Die Seminarreihe ist für das Fachpersonal der Schichtbetriebe im Kraftwerk konzipiert.

Einzelne Seminare:

KONTINUIERLICHE PERSÖNLICHKEITSENTWICKLUNG 08.01. - 01.02.2018	STEUERUNGS- UND REGELUNGSTECHNIK 01.04. - 03.04.2018	1	7
WASSERDAMPF-KREISLAUF, KRAFTWERKSHEIZUNG UND NEBENANLAGEN, ROHRLEITUNGEN 02.02. - 04.02.2018	THEORIE MEETS PRAKIS 01.04. - 03.04.2018	2	8
FÜHREN/ANFÜHREN 04.02. - 06.02.2018	HEIßTECHNIK 01.04. - 03.04.2018	3	9
TURBINE 07.04. - 09.04.2018	HIER ZUM >> NEWSLETTER ANMELDEN	4	
SCHADENSVERMIDLUNG AN DAMPFERZUGERN UND TURBINEN 08.04. - 10.04.2018		5	
ELEKTROTECHNISCHE ANLAGEN 09.04. - 11.04.2018		6	

Landing page "Skill Retention"

5. Outlook / Next Steps

In 2018, the functions of the internet page are scheduled for further refinement and continued incorporation into marketing measures. Additional marketing measures are planned.

Public Appearances

Trade fairs are an important communication platform for exchanging information and one of the most vital marketing tools for a company. For KWS, trade fairs and conventions offer the opportunity to cultivate existing contacts, make new ones and get fresh impulses for its ongoing evolution. During the report period, KWS PowerTech Training Center was present at the following trade fairs and conventions:

- KONTEC 2017, Dresden/Germany
- VGB Conference "Cogeneration Plants and Virtual Power Plants 2017", Berlin/Germany
- VGB Conference "Gas Turbines and Operation of Gas Turbines 2017", Friedrichshafen/Germany
- POWER-GEN Europe 2017, Cologne/Germany
- POWER-GEN Africa 2017, Johannesburg/South Africa
- HUSUM Wind 2017, Husum/Germany
- VGB Congress 2017 "Generation in Competition", Essen/Germany
- Ghorfa "8th Arab-German Energy Forum", Berlin/Germany"

Delegations/Visitors

During the last report period, KWS received three groups of visitors of the Carl Duisberg Centren (CDC) at its training center in Essen, Germany.

Delegation of Beijing Enterprises Holdings Limited (BEHL), China

On July 14th, 2017, a Chinese group from Beijing Enterprises Holdings Limited (BEHL) visited KWS. The delegation from Beijing wanted to get an overview of KWS' training options available in areas of power plant technology in general and thermal waste utilization (TWU) in particular. As the new owner of EEW-energy-from-waste, the visit served as a preparatory measure for future training of personnel from China. Following a general introduction to KWS, visitors were given a tour of the training center with its labs and simulators. In a concluding round of talks, the subject of comparative training levels and in-depth

training in China and Germany received particular attention. As early as October 2017, the first group from BEHL attended a 4-day seminar at KWS on the subject of "TWU in Germany" as part of their visit to the country.



Participants and lecturers of the KWS seminars "TWU in Germany"

Delegation of Tenaga Nasional Berhad (TNB) and its training center ILSAS, Malaysia

On September 19th, 2017, KWS welcomed a delegation from Kuala Lumpur. The delegation representing TNB and its training center ILSAS was given an overview of the following topics:

- Theoretical training at KWS
- Incorporating laboratories into classroom instruction
- Modern simulators
- Possible cooperation between ILSAS and KWS

The concluding round of discussion emphasized cooperation and the enhancement of respective portfolios.



TNB/ILSAS, CDC and KWS staffers

Delegation of China National Nuclear Corporation (CNNC)

On September 22nd, 2017, a delegation from the China National Nuclear Corporation paid the training center of KWS a visit. The delegation was composed of representatives of the authorities, the power industry, maintenance businesses and manufacturers.

The visitors were impressed by KWS' structured and varied training spectrum.

In order to illuminate the close link between theory and practice, the visitors' agenda included a guided tour of various laboratories (e.g. radiation protection lab) and simulator rooms. KSG/GfS contributed to the program by the viewing of a nuclear power plant simulator and a presentation of the glass model.

Simulator internship for secondary school students

On 17th and 18th January 2017, 56 students from the basic and advanced technology course and their teachers from Helmholtz Secondary School in Essen visited KWS. Subdivided into groups of approx. 15 students each, they were introduced to block unit operations of a thermal power plant on simulators at KWS's training center in Essen-Kupferdreh. Their simulator internship enabled the students to operate the screen-based control room systems themselves.

In cooperation with Maria-Wächtler Secondary School, Helmholtz Secondary School offers basic and advanced courses in the subject of "Technology" during the last two years prior to graduation. Core topics are thermal power plants, fuel cells, and renewable energies, among other things. The ongoing cooperation with KWS is designed to draw technically interested students' attention to the field of power plant technology and encourage them to get engineering degrees in energy and electrotechnology later in life. Students and teachers alike respond very well to these internships, which have been conducted regularly since 2007.

Siemens User Group Meeting 2017

Siemens AG held its "User Group Meeting 2017" at KWS whose premises offered the perfect environment for a successful event. The presentations and accompanying exhibition shown on October 18th and 19th, 2017, drew considerable attention. The main topics of the meeting were the new Siemens SPPA T2000/T3000 control engineering technology, digitalization and IT security. KWS was given the opportunity to present itself in a lecture held by its managing director,

Mr. Züfle. On that occasion, a demonstration of KWS' simulators visibly impressed the approx. 140 participants. Also, instructive talks were held on such important topics as control engineering, measurement and control technology as well as electrical drives. A Siemens roadshow truck gave many KWS students the opportunity to get acquainted with the latest measurement and control technology.

In 2017 the General Assembly of KWS awarded its silver badge of honor to:

Mr. Lutz Strumpf
- Member of the Board of Directors,
KRAFTWERKSSCHULE E.V.
2008–2017

In 2017 the general assembly of KWS awarded its bronze badge of honor to the following gentlemen:

Holger Fröscher
- Lecturer's activity since 2003
- Member of the examination board
for power plant operator training

Norbert Truch
- Lecturer's activity since 2006
- Member of the examination board
for power plant shift supervisor training
- Member/deputy chairman of the examination board
for power plant operator training

Süleyman Yüce
- Lecturer's activity since 2005
- Various assignments for team
"International Activities"

Rainer Zobel
- Lecturer's activity since 2003
- Various assignments for team
"International Activities"



Participants in hall 2 listen to the lectures by simultaneous translation from hall 1

Awarding the KWS Badge of Honor

The KRAFTWERKSSCHULE E.V. badge of honor is awarded to persons who have contributed in a voluntary capacity to the association or they have given the KWS long-term support through their influence and support in the area of teaching. This extraordinary effort can be honored with the honorary badge in bronze, silver or gold.

New Membership Fee Regulations

On September 13, 2017, the General Assembly approved a change of the KWS statute on the subject of membership fee regulations. The previous contribution model was based on the overall equivalent sustained maximum steam output of member companies. It was highly complex and no longer suited to KWS' new fields of activity (e.g. renewable energies). The new membership fee regulations categorize member companies into seven contribution classes relative to their installed nominal net electrical capacity. Special provisions were made for businesses from the fields of renewable energies and nuclear power. Large-scale business groups will be allotted group membership contributions at the discretion



Ernst Michael Züfle, Lutz Strumpf, Hubertus Altmann (f.l.t.r.)

of the KWS Board of Directors. Non-German members may continue to apply for plant-specific memberships.

Contributions for affiliated and extraordinary members remain unchanged.

The new contribution model is sustainable and its basis for assessment is easily verifiable due to the availability of official data. The administrative effort required for membership fees is therefore significantly lower.

Apartment Building

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 87 percent occupancy rate for 2017 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.



Apartment building of the KWS

KWS Conference Center

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 130 participants and equipped with all modern media and optional videoconferencing. Meals may be supplied by the staff restaurant. During the report period, KWS's facilities were booked 232 times by external hosts of seminars or conventions.



Inside view of conference room

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