

PROGRESS REPORT 2020

KRAFTWERKSSCHULE E.V.
KNOWLEDGE WORKMANSHIP SAFETY



Foreword

The current Progress Report of KRAFTWERKSSCHULE E.V. (KWS Power Tech Training Center) informs members about the basic and advanced training courses conducted, further activities and projects as well as board and panel work during the report period covering January 1st to December 31st, 2020. In 2020, the dominant topic for KWS was the impact of the Covid-19 pandemic. A pandemic team was established that, among other things, devised a pandemic strategy. In the first lockdown beginning in March and the second one beginning in December, person-to-person instruction was prohibited. Comprehensive protective measures (social distancing, hygiene, wearing masks, and ventilation) were implemented and continually developed. Formats for online learning were speedily devised and evolved substantially so that a great many courses and instruction measures could be carried out.

Another special topic was the transformation into the new legal form of an incorporated cooperative. Thanks to concentrated preparatory efforts and great support from the association's board and members, the transformation was unanimously adopted in an extraordinary General Assembly on November 5th, 2020. Formal entry in the Register of Cooperatives is expected during the first quarter of 2021.

The politically mandated conversion of Germany's power generation structure is in progress. In the first auction in accordance with Germany's Termination Act for converting coal into electricity, the Westfalen and Moorburg power plants were the winning bidders for a timely shutdown. Also, a number of decisions were made regarding the ongoing extension of renewable energies.

During the report period, enrollment in conventional power plant technology training courses for plant attendant, power plant operator, and power plant shift supervisor was very high. Due to the Coronavirus pandemic, demand for on-site courses at individual plants was low. In 2020, domestic and foreign members again availed themselves of KWS's simulator training courses for lignite, hard coal, and CCGT power plants for the purpose of maintaining high-quality, hands-on basic and advanced training for their personnel.

In Germany's Saar region, KWS conducted on-site simulator training measures for two installations deemed essential by the transmission provider in spite of little actual uptime in order to preserve operating personnel skills. For that purpose, pandemic-compatible simulator control rooms were installed and linked to the KWS online servers.

Nuclear technology seminars focused on conveying fundamentals, business management, skill retention and radiation protection.

In the field of renewable energies, training courses for wind power and hydropower plant personnel were conducted. Our new "Empower Refugees" measure reached an important milestone. All 12 refugees from Syria and Iran who had begun their training in March 2018 successfully passed the CCI exam for "Wind Power Industrial Electrician".

Overall demand in the area of thermal waste treatment was again very high. Due to the need for basic and advanced training in this branch of the power industry, KWS has been devising specific training courses on the shift supervisor level and below in close coordination with ITAD, the inter-trade organization of Germany's TWT industry and the CCI Essen. Various member companies react to market demands through change and optimization measures. KWS accompanies and assists such measures at the operations and shift level with Best Practice Workshops in the areas of social, methodical, and personal skills, for example. These workshops focus on workplace behavior, teamwork, communication, decision-making as well as supervision and monitoring.

In international activities, the workload was lower than usual because of the pandemic. Courses were conducted in Saudi Arabia, Turkey, and Iraq.

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 consulting 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



Performance in 2020

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 and Radiation Protection 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, 2020	Courses conducted	Number of Participants	Number of Participant Days
Conventional Power Plant Technology	93	1.134	31.538
Nuclear Technology/Radiation Protection	30	268	1389.
Simulator Training	84	353	1.543
Organization Development	21	465	470
Renewable Energies	3	30	4.210
International Activities	1	21	210
Total	232	2.271	39.360

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.

Very successful in 2020 was the launch of skill enhancement courses in the field of thermal waste treatment (TWT). KWS now offers the new, future-oriented specializations "KWS-Certified Plant Operator" and "CCI-Certified TWT Power Plant Shift Supervisor".

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, 2020	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Operators	15	242	10.000
Power Plant Shift Supervisors–Production	13	239	14.422
Power Plant Shift Supervisors– Production Electrical and Control Engineering	4	83	426
Thermal Waste Treatment (TWT)	8	85	3.147
Advanced Training Measures	21	310	2.232
Customer-Specific Advanced Training Measures	32	175	1.311
Total	93	1.134	31.538

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

Plant Attendants

20th training course (Essen/Germany)

Module Basic with 48 participants

Module Steam Generation with 46 participants

Module Turbines with 44 participants

21st training course (Essen/Germany)

Module Basic with 47 participants

Module Steam Generation with 47 participants

Module Turbines with 41 participants

Plant Operator TWT

04th training course with 10 participants

05th training course with 20 participants

Power Plant Operators

122nd training course with 48 participants

123rd training course with 23 participants

124th training course with 48 participants

KWS-certified Operator Production for EEW Energy from Waste GmbH

07th training course with 7 participants

Power Plant Shift Supervisors–Production

139th training course with 15 participants

140th training course with 40 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 personnel as well as officially approved courses for qualification acquisition and updates 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, 2020	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Shift Supervisors–Radiation Protection	2	8	360
Nuclear Basics	0	0	0
Skill Retention	14	135	263
Skill Acquisition in Radiation Protection	4	19	326
Special Courses Nuclear Technology/Radiation Protection	10	106	440
Total	30	268	1.389

Simulator Training

The KWs simulators in Essen are utilized to practice efficient power plant operations under normal operating condition as well as handling malfunctions effectively. In addition to safe plant operations, process engineering technology interaction is immersively trained if so required. By being able to deal with critical plant scenarios in this risk-free environment, operating personnel is enabled to acquire confidence in managing such situations in the real-life installation. Crews from standby or reserve plants receive little exposure to actual operations due to infrequent operating times of their installations. It is therefore challenging to maintain operational practice, safety and skills of such personnel. KWS assists businesses with customized simulator training in all such cases. Aside from operations training, simulator sessions may be used to practice social skills like teamwork, leadership and communication as well as work out and establish decision-making strategies. KWS rich experience of many years in these areas contributes to an ongoing process of improvement in power plant operations. If so desired, simulator training may be conducted on location – at the power plant or the local training center – all around the world.

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

January 01 – December 31, 2020	Trainings conducted	Number of Participants	Number of Participant Days
Hard Coal/Lignite/Gas/Oil 300 MW (FOKS)	0	0	0
Lignite 600/1100 MW	31	146	653
Hard Coal 800 MW	28	108	414
Hard Coal 1100 MW	15	57	285
CCGT 750-S/D (SPPA-T2000)	4	18	71
CCGT 750-3 (SPPA-T3000)	6	24	120
Total	84	353	1.543

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.

Due to the Coronavirus pandemic, the committee did not convene during the report period:

The Construction Committee concerned itself with the following topic:

- Upgrade of the simulator to the current version of the power plant control engineering system SPPA- T3000 V8.2

Organization Development

Member businesses routinely react to market challenges by adjustment measures that often do not result in the desired changes and improvements in ongoing operations. Here, KWS is on hand with a wide range of offerings on personnel selection, team development, organization development, conflict management, and management coaching. 2020 saw a marked expansion of the portfolio in this field. In the long run, KWS aspires to become the leading provider of soft skill training and consulting in the area of personnel and organization development for the power industry. Unfortunately, the Coronavirus pandemic and the accompanying restrictions hampered the relaunch considerably in 2020. However, customer inquiries during the last months of 2020 inspire confidence that we will be able to improve workplace processes and industrial relations in many businesses in the coming year.

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

January 01 – December 31, 2020	Courses/Measures conducted	Number of Participants	Number of Participant Days
OD Consulting and Workshops	20	460	460
OD Seminars	1	5	10
Total	21	465	470

Renewable Energies

For the Renewable Energies team, too, the year 2020 was characterized by the Coronavirus pandemic and its impact on customers and training courses conducted. Hydropower training measures were hit especially hard. Both scheduled courses had to be canceled. In the spring, lockdown-mandated travel restrictions prevented the execution of the training, whereas the number of participants was too low for the training course in the fall. In the field of wind power, KWS's real-life training installation was to be employed as a unique technical basis for safety training and practice-oriented instruction in 2020. However, Corona-forced hygiene and social distancing regulations dampened customer demand so much that no courses were actually conducted in the end. In spite of such adversities, the government-funded "Empower Refugees" project continued to develop positively. Following the successful conclusion of the first training course in the spring of 2020 (see "KWS compact" for more on this), all 13 participants of the second course registered for the CCI exam in December 2020. Step by step, bioenergy, biomass, and biogas are gaining in importance in small-scale as well as industrial-scale applications. KWS progressively incorporates these topics into existing training courses. Germany's energy transformation requirements give the topic of green hydrogen an enormous boost. In order to assist members as best we can, KWS launched an effective working group in the fall of 2020, which will develop and conduct specific training courses in cooperation with the leading market participants.

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

January 01 – December 31, 2020	Courses conducted	Number of Participants	Number of Participant Days
Renewable Energies	3	30	4.210

International Activities

Naturally, the Coronavirus pandemic characterized KWS's international activities in the year 2020 to an extreme degree. That is why training events in Turkey had to be aborted and only one Basic Operational Training was conducted for Siemens in Jordan. All further scheduled training measures in Saudi-Arabia, Iraq, Pakistan, and France were postponed until 2021.

KWS has used the extra time to make most training offerings available online as well. For an Iraqi customer, a training requirements and potential analysis was developed. It is based on a digital instruction platform and will be conducted in the spring of 2021 accompanied by online expert interviews.

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

January 01–December 31, 2020	Courses conducted	Number of Participants	Number of Participant Days
International Activities	1	21	210

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 five times during the report period:

101st meeting January 17th, 2020 (conference call)

102nd meeting March 11th, 2020 (conference call)

103rd meeting May 28th, 2020 (conference call)

104th meeting September 10th, 2020 (conference call)

105th meeting October 28th, 2020 (conference call)

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/Germany

(since November 2020)

Giesen, Ralf

Member of the Board of RWE Power AG and

Chief Human Resources Officer (CHO),

RWE Power AG, Cologne/Germany

Lücker, Guido

Technical Manager

of EEW Energy from Waste Hannover GmbH, Hannover

(from June 2020)

Müller, Karl-Heinz

Member of the Management of

EEW Energy from Waste GmbH, Helmstedt/Germany

(since June 2020)

Reinhard, Volker

Head of HR Production Department (P-AE),

EnBW Energie Baden-Württemberg AG, Stuttgart/Germany

Vermeyen, Raf

Managing Director of ENGIE Fabricom N.V., Hoboken/Belgium

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 2019, the review of operation including the attachment and recommended that the board approve KWS's financial statement for 2019 as is. Consultation of the economic, investment and financial plans for the business year 2021 was carried out by the Financial and Legal Committee. It recommended to the board that it submit them in the General Assembly in 2020.

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 corona pandemic.

The following activities took place during the report period:

64th meeting April 22nd, 2020

65th meeting September 23rd, 2020

Eck, Jens, Dr. (Chairman)

Lausitz Energie Kraftwerke AG/

Lausitz Energie Bergbau AG, Cottbus/Germany

Bartels, Monika

RWE Power AG, Essen/Germany

Frey, Rainer, Magister

VERBUND-Hydro Power GmbH, Vienna/Austria

Ketterer, Marcel

EnBW Energie Baden-Württemberg AG, Karlsruhe/Germany

Sennekamp, Peter
Uniper Kraftwerke GmbH, Düsseldorf/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 141st and 142nd Power Plant Shift Supervisor–Production training course and those of the 50th 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:

133rd meeting June 18th, 2020 (online session)

134th meeting December 10th, 2020 (online session)

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

Hark, Guido (Deputy Chairman)
RWE Power AG, Eschweiler/Germany

Ahrens, Carsten
PreussenElektra GmbH, Grohnde Nuclear Power Plant,
Emmerthal/Germany

Hager, Frank, Deputy Assistant Under-Secretary
Ministry for the Economy, Innovation, Digitilization
and Energy of the State of Northrhine-Westphalia,
Düsseldorf/Germany

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

Kirstein, Klaus-Dieter
KDK Consulting, Düsseldorf/Germany

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

Kurzmann-Friedl, Christof, DI
VERBUND Thermal Power GmbH & Co KG,
Dürrrohr Location, Zwentendorf/Austria

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

Palm, Torsten
Lausitz Energie Kraftwerke AG, Lippendorf Power Plant,
Neukieritzsch OT Lippendorf/Germany
(since June 2020)

Paus, Christoph
UNIPER SE, Essen/Germany

Schuknecht, Michael, Dr.-Ing.
TÜV NORD Systems GmbH & Co KG, Essen/Germany

Stenzel, Oliver
Lausitz Energie Kraftwerke AG, Kraftwerk Schwarze Pumpe,
Spremberg/Germany
(from March 2020)

Then, Oliver, Dr.
VGB PowerTech e.V., Essen/Germany

Tschersich, Conrad
AWG Abfallwirtschaftsgesellschaft mbH Wuppertal,
Wuppertal/Germany

Volkman, Peter
Grosskraftwerk Mannheim Aktiengesellschaft,
Mannheim/Germany
(from March 2020)

Wiegel, Michael
RWE Generation SE, 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, Membranes Business Unit, Wuppertal

Abfallwirtschaftsgesellschaft mbH Wuppertal, Wuppertal

AGR Betriebsführung GmbH, Herten

AHLSTROM-MUNKSJÖ PAPER GMBH, Aalen

Allessa GmbH, Werk Cassella-Offenbach, Frankfurt am Main

AMK Abfallentsorgungsgesellschaft des Märkischen

Kreises mbH, Iserlohn

AVEA Entsorgungsbetriebe GmbH & Co. KG, Leverkusen

Basell Polyolefine GmbH, Werk Wesseling, Wesseling

BASF SE, Ludwigshafen

Bayer AG, Bergkamen

Bayer AG, Berlin

Berliner Stadtreinigungsbetriebe,

Abfallbehandlungswerk Nord, Berlin

Bremerhavener Entsorgungsgesellschaft mbH, Bremerhaven

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

Braunschweig

Cerdia Produktions GmbH, Freiburg

CURRENTA GmbH & Co. OHG, Leverkusen

DREWAG Stadtwerke Dresden GmbH, Dresden

DSM Nutritional Products GmbH, Grenzach-Wyhlen

DS Smith Paper Deutschland GmbH, Aschaffenburg

DS Smith Paper Deutschland GmbH, Witzenhausen

EEW Energy from Waste Helmstedt GmbH, Helmstedt

EnBW Energie Baden-Württemberg AG, Stuttgart

EnBW Kernkraft GmbH, Obrigheim

enercity AG, Hanover

Energie AG Oberösterreich Erzeugung GmbH, Linz/Austria

Energie- und Wasserversorgung Bonn/Rhein-Sieg GmbH (SWB),
Bonn

Energieversorgung Oberhausen AG, Oberhausen

Energieversorgung Offenbach AG, Offenbach

ENTEKA AG, Darmstadt

Erlanger Stadtwerke AG, Erlangen

Essity Operations Mannheim GmbH, Mannheim

EVN AG, Maria Enzersdorf/Austria

Evonik Operations GmbH, Marl

Fernwärme Ulm GmbH, Ulm

Gemeinschafts-Müllverbrennungsanlage Niederrhein GmbH,
Oberhausen

GfA Gemeinsames Kommunalunternehmen für Abfallwirtschaft,
Olching

GKS-Gemeinschaftskraftwerk Schweinfurt GmbH, Schweinfurt

Grosskraftwerk Mannheim AG, Mannheim

Hamburger Stadtentwässerung AöR, Hamburg

HEB GmbH, Hagener Entsorgungsbetrieb, Hagen

Heizkraftwerk Pforzheim GmbH, Pforzheim

Heizkraftwerk Würzburg GmbH, Würzburg

Henkel AG & Co. KGaA, Düsseldorf

IHKW Industrieheizkraftwerk Andernach GmbH, Andernach

INEOS N.V., Zwijndrecht/Belgium

InfraServ GmbH & Co. Gendorf KG, Burgkirchen

InfraServ GmbH & Co. Höchst KG, Frankfurt am Main

InfraServ GmbH & Co. Wiesbaden KG, Wiesbaden

K + S Minerals and Agriculture GmbH, Philippsthal

K + S Minerals and Agriculture GmbH,

Werk Neuhof-Ellers, Neuhof

Kämmerer Energie GmbH, Osnabrück

Kernkraftwerk Gösgen-Däniken AG, Däniken/Switzerland

Knapsack Power GmbH & Co. KG, Düsseldorf

Kraftwerke Mainz-Wiesbaden AG, Mainz-Wiesbaden

Kraftwerk Mehrum GmbH, Hohenhameln
 Kraftwerk Obernburg GmbH, Obernburg
 Kraftwerk Schwedt GmbH & Co. KG, Schwedt
 Kreis Weseler Abfallgesellschaft mbH & Co. KG, Kamp-Lintfort

Lausitz Energie Kraftwerke AG, Cottbus
 Linz Strom Gas Wärme GmbH für Energiedienstleistungen
 und Telekommunikation, Linz/Austria

MAINOVA AG, Frankfurt am Main
 Mark-E AG, Hagen
 Mercedes-Benz AG, Sindelfingen
 MHB Hamm Betriebsführungsgesellschaft mbH, Hamm
 MHKW Müllheizkraftwerk Frankfurt am Main GmbH, Frankfurt
 MIBRAG Mitteldeutsche Braunkohlegesellschaft mbH, Zeitz
 Mohn media Mohndruck GmbH, Gütersloh
 Moritz J. Weig GmbH & Co. KG, Mayen
 Müllheizkraftwerk Rothensee GmbH, Magdeburg
 Müllverbrennung Kiel GmbH & Co. KG, Kiel
 Münchener Stadtentwässerung, Munich
 MVA Weisweiler GmbH & Co. KG, Weisweiler
 MVV Umwelt Asset GmbH, Mannheim

N-ERGIE Kraftwerke GmbH, Nuremberg
 Norske Skog Bruck GmbH, Bruck an der Mur/Austria

OMV Downstream GmbH, Vienna/Austria
 Onyx Kraftwerk Farge GmbH & Co. KGaA, Bremen
 A member of the ONYX Power Group
 Onyx Kraftwerk Wilhelmshaven Betriebs GmbH & Co. KGaA,
 Wilhelmshaven, A member of the ONYX Power Group
 Onyx Kraftwerk Zolling GmbH & Co. KGaA, Zolling
 A member of the ONYX Power Group
 OQ Chemicals Produktion GmbH & Co. KG, Werk Ruhrchemie,
 Oberhausen

Powerplant Rotterdam B.V.,
 A member of the ONYX Power Group,
 LB Maasvlakte Rotterdam/Netherlands
 PreussenElektra GmbH, Hanover
 PreZero Energy GmbH, Bernburg
 psm WindService GmbH & Co. KG, Erkelenz

Raubling Papier GmbH, Raubling
 R.D.M. Arnsberg GmbH, Arnsberg
 RKB Raffinerie-Kraftwerks-Betriebs GmbH, Essen

RWE Power AG, Essen
 Group Membership for
 - Gemeinschaftskraftwerk Bergkamen A OHG, Bergkamen
 - RWE Generation SE
 - RWE Nuclear GmbH
 - RWE Generation NL B.V., Netherlands
 - RWE Generation UK plc, Didcot B CCGT Power Station,
 Oxfordshire/Great Britain

Salzburg AG, Salzburg/Austria
 Salzgitter Flachstahl GmbH, Salzgitter
 Sappi Austria Produktions-GmbH & Co. KG, Gratkorn/Austria
 Sappi Ehingen GmbH, Ehingen
 Schluchseewerk AG, Laufenburg
 SchwörerHaus KG, Hohenstein
 Smurfit Kappa Zülpich Papier GmbH, Zülpich
 Solvay Chemicals GmbH, Hanover
 Spreerecycling GmbH & Co. KG, Spremberg
 SRS Eco Therm GmbH, Salzbergen
 Stadtwerke Augsburg,
 Elektrizitäts- und Fernwärmeversorgung,
 Wärme- und Stromerzeugung, Augsburg
 Stadtwerke Düsseldorf AG, Düsseldorf
 Stadtwerke Flensburg GmbH, Flensburg
 Stadtwerke Heidelberg Netze GmbH, Heidelberg
 Stadtwerke Karlsruhe GmbH, Karlsruhe
 Stadtwerke Leipzig GmbH, Leipzig
 Stadtwerke Münster GmbH, Münster
 Stadtwerke Rosenheim GmbH & Co. KG, Rosenheim
 Stadtwerke Rostock AG, Rostock
 Stadtwerke Schwerin GmbH, Schwerin
 Städtische Werke Energie + Wärme GmbH, Kassel
 STEAG GmbH, Essen
 Stora Enso Maxau GmbH, Karlsruhe
 swb Entsorgung GmbH & Co. KG,
 Müllheizwerk Bremen, Bremen
 swb Erzeugung AG & Co. KG, Bremen

TEAG Thüringer Energie AG, Erfurt
 Technische Betriebe Solingen (TBS), Solingen
 Thyssen Krupp Steel Europe AG, Duisburg
 T-Power Energie Services BV, Tessenderlo/Belgium
 TWL Technische Werke Ludwigshafen AG,
 Ludwigshafen am Rhein

Uniper Benelux N.V., Rotterdam/Netherlands
 Uniper Kraftwerke GmbH, Hanover

Vattenfall Europe Nuclear Energy GmbH, Hamburg
 Vattenfall Heizkraftwerk Moorburg GmbH, Hamburg
 Vattenfall Wärme Berlin AG, Berlin
 Vattenfall Wasserkraft GmbH, Berlin
 Venator Germany GmbH, Duisburg
 Veolia Industriepark Deutschland GmbH, Heinsberg
 VERBUND Hydro Power GmbH, Vienna/Austria
 VERBUND Thermal Power GmbH & Co. KG,
 Fernitz-Mellach/Austria
 voestalpine Stahl GmbH, Linz/Austria
 Vulkan Energiewirtschaft Oderbrücke GmbH, Eisenhüttenstadt
 VW Kraftwerk GmbH, Wolfsburg

Wärme Hamburg GmbH, Hamburg
 WIEN ENERGIE GmbH, Vienna/Austria

ZAK Energie GmbH -Müllheizkraftwerk-, Kempten
 Zweckverband Abfallverwertung Südostbayern, Burgkirchen
 Zweckverband für Abfallwirtschaft in Nordwest-Oberfranken,
 Dörfles-Esbach
 Zweckverband Müllheizkraftwerk Stadt und Landkreis Bamberg,
 Bamberg
 Zweckverband Müllverwertung Schwandorf, Schwandorf
 Zweckverband Müllverwertungsanlage, Ingolstadt
 Zweckverband Restmüllheizkraftwerk Böblingen (RBB),
 Böblingen

Affiliated Members

FGW e.V. – Fördergesellschaft Windenergie
 und andere Erneuerbare Energien, Berlin
 GfS Gesellschaft für Simulatorschulung mbH, Essen
 Kerntechnik Deutschland e.V., Berlin
 Technical University of Munich,
 Kerntechnik Deutschland e.V., Berlin
 FRM II: Research Neutron Source Heinz Maier-Leibnitz,
 Garching
 VAIS Verband für Anlagentechnik und Industrieservice e.V.,
 Düsseldorf
 VGB PowerTech e.V., Essen
 VIK Verband der Industriellen Energie- und Kraftwirtschaft e.V.,
 Essen

Sponsoring Members

Carl Duisberg Centren, Cologne
 GESTRA AG, Bremen
 KONRAD Meß- & Regeltechnik GmbH, Gundremmingen
 OffTEC Base GmbH & Co. KG, Enge-Sande
 SHE Solution Bergmann GmbH & Co. KG, Enger
 Siemens Gas and Power GmbH & Co. KG, Erlangen
 Siemens Gas and Power GmbH & Co. KG, Essen
 S.T.E.P. Consulting GmbH, Aachen

Membership Development

On December 31st, 2020, the KRAFTWERKSSCHULE E.V. had 155 members, 140 of which were ordinary, eight were affiliated and seven were sponsoring members.

During the report period, one company joined KWS as an ordinary and one company as a sponsoring member. 42 member companies left KWS; seven membership were revoked.

In accordance with the new membership contribution ordinance passed on September 13th, 2017, individual membership fees are assessed based on net nominal installed electrical capacity in megawatts as listed by the German Federal Network Agency.

The grand total capacity of all ordinary members during the report period stands at 88,501 MW.

16 member companies are based outside of Germany, namely:

- eleven companies in Austria,
- two companies in Belgium,
- two companies in the Netherlands,
- one company in Switzerland,

The net nominal installed electrical capacity of the foreign member companies adds up to 18,435 MW or approximately 23 % of the total amount of all ordinary members.

MEMBERS

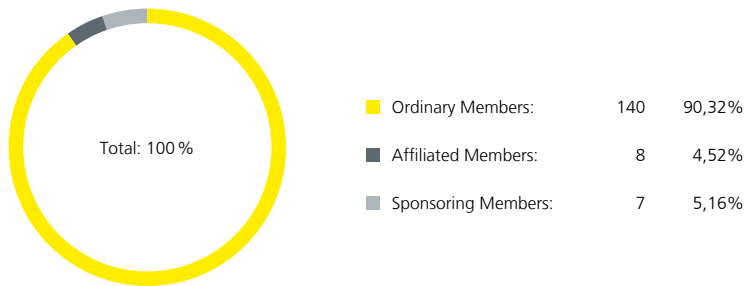
Listing of all members (As at December 31st, 2020)

Fig. 1

COMPOSITION OF THE GROUP OF ORDINARY MEMBERS

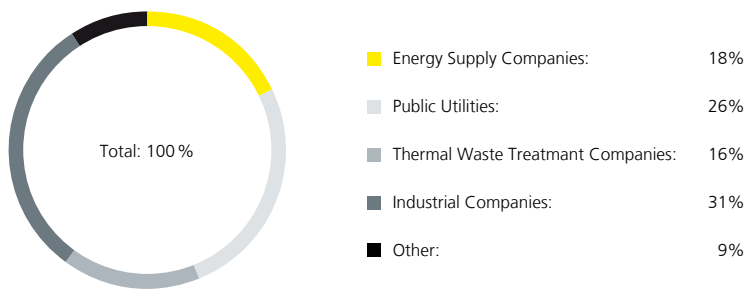
Listing of all ordinary members (As at December 31st, 2020)

Fig. 2

BREAKDOWN OF NET NOMINAL ELECTRICAL CAPACITY OF ALL ORDINARY MEMBERS:

	Ordinary Members		Net nominal electrical capacity	
	Number	Percentage %	MW	Percentage %
up to 250 MW	99	70,71	4.394	4,96
251–500 MW	12	8,57	4.156	4,70
501–1.000 MW	11	7,86	7.232	8,17
1.001–2.500 MW	11	7,86	15.919	17,99
2.501–5.000 MW	2	1,43	6.147	6,95
5.001–8.500 MW	2	1,43	15.985	18,06
above 8.500 MW	3	2,14	34.668	39,17
Total	140	100,00	88.501	100,00

KWS in General

Change of Legal Form

The Board of Directors of KRAFTWERKSSCHULE E.V. is convinced that, given the pertinent legal and tax-related conditions, a change of legal form from a registered association to an incorporated cooperative in accordance with Art. 21, German Civil Code, is both necessary and expedient in order to maintain services currently provided by the association. This new legal form is best suited to sustain the association's current structure and continue its successful efforts on the one hand while on the other hand creating a legally compliant framework to conduct and develop such efforts in the future. All potential options for a redesign considered, the transformation of the registered association into an incorporated cooperative turned out to be the most realistic and sensible. The structure of an incorporated cooperative is very much like that of a registered association, yet lends itself much better to the strategic development of the business than a non-profit association permits.

All existing products and services provided by the association will continue to be available from the cooperative. This crucial point will remain unchanged in the future. Article 1 of Germany's Cooperative Societies Act states that an incorporated cooperative is exclusively obligated to further and serve the commercial interests of its members.

An incorporated cooperative also enjoys more entrepreneurial freedom because it is not legally bound by the restrictions imposed by law on a registered association, which is primarily a charitable organization that may use its funds only in accordance with its statute and cooperate only with other charities, for example.

The cooperative is a member of an audit association that reviews the state of the business, management compliance, and the annual financial statement every year in the interest of the cooperative's members. This offers members more control, transparency, and security compared to a registered association.

The structure of an incorporated cooperative with its General Assembly, Board of Supervisors, and Board of Directors gives members an equal measure of leverage as in a registered association.

Based on these benchmark data, the General Assembly voted unanimously on November 5, 2020, in favor of the transformation into an incorporated cooperative. The vote was duly notarized. The new name of the organization will be KWS Energy Knowledge eG.



Rebranding

In the course of changing the legal form of KWS, its committees have been concerning themselves in detail with a name change, a new logo, and an updated public profile in general. "KWS Energy Knowledge eG" was the new name eventually selected from a large number of suggestions. For decades, KWS has been and continues to be a well-established brand with a positive connotation, therefore, the acronym is retained. "Energy Knowledge" describes the core activity of KWS, namely the conveyance of comprehensive information on the topic of energy. An English-language name enhances the brand's international marketability.

The new logo is a word/image hallmark that projects new impulses and accommodates all current types of energy used in the power industry.

Gray represents conventional energies, blue stands for hydro-power, yellow for solar power, and green for wind power. This gives KWS a modern and lively appearance expressed by the natural flow of the logo.

Impact of the Coronavirus Pandemic

In 2020, the dominant topic for KWS was the impact of the Covid-19 pandemic. A special team was set up that devised a pandemic plan, among other things. The team met regularly to consider new developments and political directives and their effect on KWS.

Comprehensive protective measures (social distancing, hygiene, wearing masks, and ventilation) were implemented and continually developed. A Coronavirus hotline was installed for the benefit of staff members, training participants, and instructors so they could receive information on infection, symptoms, or contact with infected individuals.

In the first lockdown from March 16 to May 5, 2020, and the second one beginning on December 16, 2020, person-to-person instruction was prohibited. Formats for online learning were speedily devised and evolved substantially so that a great many courses and instruction measures could be carried out. Considerable investment was made in hard- and software. Just to be on the safe side, many compact courses were canceled or postponed until the following year. Training in the fields of organization development, international activities, and renewable energies were also negatively affected by the pandemic.

Back in 2018, KWS had already come to a shop agreement concerning home office activities, which, given the increased demand for this kind of work in the pandemic, provided a clear-cut regulatory framework. In addition, faculty and staff had been equipped with business laptop computers in 2019 so that all the hard- and software necessary for home office operations was already in place.

Digital Learning Challenge at KWS

The Coronavirus pandemic has boosted a variety of developments in the area of digital learning, including at KWS. Within the briefest period of time, training courses were converted from in-person to online instruction. A number of software products were employed for that purpose. In order to conduct online lessons at the beginning of the first lockdown, KWS decided to use the Goto-Meeting conference software. In spite of some initial stumbling blocks to be overcome, course directors and instructors were able to quickly switch from in-person to online teaching.

Again and again, various types of online instruction were tried out. Lessons were conducted in part by instructors in a home office format. Another option was to stream classroom lectures online. When spatial constraints during in-person sessions made it necessary to disperse students, the lecture was transmitted to the various classrooms via an on-air broadcast. For several years now, KWS has been successfully using the Moodle learning platform for its online courses. Employment of this platform has expanded the conversion to online lessons significantly. For that purpose, the software was first updated. All relevant information of the training course is available to the participants in their online classroom during the entire course. The in-house Moodle messaging system is used for swapping information among the students.

The pandemic demands a maximum of flexibility from participants as well as from course directors and instructors.

“Machinist TWT” and “Foreman TWT” training at Weisweiler Waste Incineration Plant

In 2018, the Weisweiler waste incineration plant was confronted with the challenge of having to completely replace its operations personnel within 18 months.

As the operator of a thermal waste treatment (TWT) facility, the Weisweiler plant was assisted by KWS in the development of an advanced training measure, which, aside from comprehensive practical training at the home facility, contained theoretical training as well. The “Machinist TWT” and “Foreman TWT”, both CCI-certified, were developed jointly. Weisweiler waste incineration plant personnel training that had begun in 2019 continued and was completed in 2020. In the first quarter of 2020, the fourth personnel training module designed for shift supervisors and their deputies was successfully conducted. The 10 participants attained the CCI-certified “Foreman TWT” qualification.

After a Coronavirus-caused cessation in July and August of 2020, a final oral exam of all training participants as part of an expert discussion took place on site by request of the Weisweiler plant’s management. Here, too, KWS provided assistance in the planning of the event and composed part of the examination commission along with a representative of the plant and a third-party instructor. All training participants passed the exam.

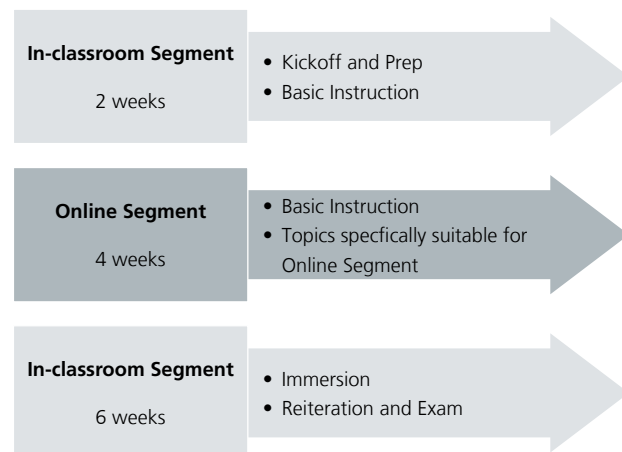
The findings from the intense interchange between the Weisweiler waste incineration plant and KWS about the requirements of theoretical training have made the rounds in the marketplace. KWS is the partner to go to for thermal waste treatment businesses intent upon honing their crews’ skills for running their installations.

Plant Operator TWT Hybrid

The specific challenges of the Coronavirus pandemic have led to the creation of the Plant Operator TWT Hybrid training course.

In early September, 2020, the fourth Plant Operator TWT training course commenced with 21 participants from Germany and Austria. As the course progressed, the Covid-19 situation changed the training conditions and caused some particular challenges. Social distancing rules, travel restrictions and quarantining requirements made alternating modes of training necessary. Due to travel restrictions for Austria and Germany, about half of the participants trained online for several weeks while the other participants and the instructor were in their classroom at KWS. Communication between participants in Essen, in Austria, and the instructor was made possible by employing cameras and microphones. Live online training was also conducted.

Due to the positive feedback to the plant operator courses, including online training, the training schedule was modernized and flexibilized in cooperation with the respective businesses to create the Plant Operator TWT course in a hybrid form:



The course should always commence at KWS, current conditions permitting. Participants and instructors can get acquainted and fundamentals are acquired jointly. Subsequently, the online segment takes place with customized training units. Preparing for the examination and immersion in the various topics are then scheduled for the in-classroom segment to follow. That way, the advantages of in-classroom and online training may be combined. Also, participating businesses can reduce their costs.

Simulator Training for Skill Acquisition and Retention in essential STEAG Power Plants

The STEAG power plants Weiher and Bexbach are considered essential and have been on the grid reserve roster for several years. They go online only on demand from Amprion, the transmission provider, for service security.

This poses a great challenge to the operating crews. With little actual uptime per year, it is not only hard to train new crew members but also to preserve the know-how, practice, and operating skills of the old hands. Power plants that stand still most of the time offer little opportunity to build or maintain operating skills. Still, these plants must be able to go online within 12 hours at any time.

For that reason, KWS is already in its second year of conducting practical operations training on a power plant simulator on location at the power plants. Each site has been equipped by KWS with a complete simulated control room with several operator stations and large-screen projection. At the Weiher plant, there is a real-life operator station inside the training room in addition to the simulator. This permits observing the live power plant process and evaluating the power plant's history. Following a simulator training module, participants discuss the subject at hand. The original operator station is employed to address the operations and technology specifics of the home plant.

Training emphasizes the transfer of plant-specific know-how from experienced operators to novices, thereby combining hands-on operations training and knowledge transfer from seasoned to non-experienced personnel. This safeguards proper plant operations in the future.

Live Online Simulator Training

The Coronavirus pandemic has been a great challenge for KWS and for everyone else. Flexibility and creativity have been the watchwords for the past months.

Even in these difficult times, it is important to continue basic and advanced training of operations crews and thereby contribute to low-risk and efficient operations of power supply installations. KWS has been implementing safe distance learning options for its simulator training.

Since late 2019, KWS has been conducting simulator training in the STEAG power plants at Bexbach and Weiher. Initially, instruction took place on location in special, fully equipped simulated control rooms. By the end of 2020, training at the Bexbach plant switched to distance learning. While the trainees were in the on-site simulated control room as usual, the instructors utilized online communications and remote control tools for the operator stations of the participants.

Distance learning enables the operations crew to remain in a safe environment at the power plant, yet still take part in a comprehensive simulator training course assisted, moderated, and guided by KWS instructors. Plant-specific hygiene concepts can be implemented perfectly.

In order to be fully prepared for future assignments, the KWS simulation team has installed a special distance learning control room in the KWS building. This permits an immediate response to possible restrictions placed on the feasibility of scheduled training courses and to conduct training in the usual quality without any shortfall.

Simulation Technology: State-of-the-art Control Engineering Upgrade for the Simulator for Lignite Power Plants

Installing the latest version of the control engineering software for the simulator for lignite-fueled power plants became necessary so that the three simulator variants would continue to emulate the technology of the actual plants as realistically as possible. After taking delivery of the required new computer hardware in December 2019, upgrade efforts on the variant of Niederaußem's block unit G began in the spring of 2020 and were completed in early June. Subsequently, a number of performance tests were conducted on the simulator in cooperation with a group of Niederaußem's block unit G operating personnel. Checks comprised a variety of operations situations like cold starting to full load, shutdown to light load, pump switch, various maximum load scenarios, and malfunctions. The simulator was then cleared for instruction assignments, installed on the training platform at the Niederaußem training center, and incorporated into the training schedule.

Following that, work on the adoption of the updated automation code for the second simulator variant, Neurath's block unit D, was conducted on the testing and development platform. Once the necessary modifications of the interface to the simulator's process model had been made, a startup procedure was successfully performed on the simulator. This variant, too, was cleared for instruction assignment by operations personnel from Neurath's block unit D after the successful conclusion of relevant performance tests. It has been in use for training since late October 2020.

Finally, the code adoption for the third variant, Neurath power plant's block unit G, was begun in November 2020. Work on this variant is scheduled to be completed in the spring of 2021. Thanks to these efforts, the control engineering codes from the actual plants may continue to be utilized in the future and keep the simulator state-of-the-art.

KWS project "Empower Refugees" for the Integration of Migrants

In 2020, the first training course for the "Empower Refugees" project made the home stretch. The CCI exam for Industrial Electrician Production Engineering (CCI) for the wind power industry was to take place in the spring of 2020. Would all 12 refugees, who had been working their way through the pilot course since 2018, succeed?

The five-week shutdown of the school by force of the Coronavirus pandemic and the unexpected insolvency of the third-party training workshop in the middle of the hot stage of exam preparations in early 2020 jeopardized the success of the project considerably. Several problems had to be solved on short notice. Among other things, the training concept had to be amended by efficient online distance learning, which was quite challenging given the language deficits of the participants. The loss of the training workshop was compensated by remodeling KWS's former auditorium to create an electro-technics training workshop. For that purpose, all necessary teaching materials had to be acquired and instructors for hands-on training recruited within just a few days.

Ultimately, team spirit, panache, and the courage to improvise when necessary prevailed and led to a remarkable triumph. All 12 participants passed their final exams and have since been working for various businesses as industrial electricians for production engineering.

We would like to express our gratitude to our supporters inside and outside of KWS and congratulate the participants on their success in these unusual times.



Mister Thomas Kufen (Lord Mayor of the City of Essen) and participants after graduation ceremony

Quality Management at KWS

First-class quality all around is what we strive for every day. One important component in that strife is our quality management system, which was completely overhauled in 2016 in order to meet the requirements of the DIN EN ISO 9001:2015 standard. To make sure that the system does not linger in the sidelines, but determines and sustainably assists our actual workplace efforts, it was designed by KWS itself. While the management provided a general framework and concept, many staffers worked out concrete processes and procedures. This laid the groundwork for high acceptancy and sustainable application. The second supervisory audit of the quality management system, which was conducted on November 18th, 2020, yielded outstanding verification and effectiveness results and revealed no deviation from the standard or deficits of any kind. In

2021, we will implement the suggestion for improvement of validating hybrid events.

The supervisory audit of our AZAV license (Accreditation and Licensing Ordinance for the Promotion of Employment) on November 13th, 2020, went so well that we will continue to meet the requirements for publicly funded training courses.

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.

The COVID-19 pandemic led to the cancellation and postponement of numerous events. Consequently, KWS made only one appearance on location during the report period:

- North Rhine-Westphalia Wind Energy Industry Day (Branchentag Windenergie NRW), Gelsenkirchen/Germany

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 73 percent occupancy rate for 2020 (previous year approx. 90 percent) proves that despite the pandemic situation, 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 38 times by external hosts of seminars or conventions.



Inside view of conference room



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