ENERGY KNOWLEDGE FOR YOU

PROGRESS REPORT 2023

KWS Energy Knowledge eG

Foreword

The Progress Report of KWS Energy Knowledge eG (KWS) at hand informs members about basic and advanced training measures conducted, further activities and projects as well as board and panel work during the report period of January 1st, 2023 to December 31st, 2023.

Remodeling the power generation structure to achieve decarbonization continues to be the immutable goal of Germany's federal government. Russia's war of aggression against Ukraine, however, has led to considerable adaptive measures, especially due to the reduction and eventual termination of natural gas deliveries from Russia. The final shutdown of Germany's last three nuclear power plants took place in April 2023, which means that several hard coal- and lignite-fired power plants will have to operate longer than heretofore planned as the only way of ensuring security of supply. Expanding renewable energies has been increasing under the current federal government, but the necessary political framework for the erection of new gas-fired powerplants has not been created so far.

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. Once again, members, both foreign and domestic, used KWS's simulator courses for lignite-, hard coal-fired, and CCGT power plants to ensure practical, high-quality basic and advanced personnel training in 2023.

For power plants designated systemically relevant by the transmission network operator, KWS conducted simulator training on location for the purpose of personnel skill retention, low operating hours of the real-life plants notwithstanding. To that end, simulated control rooms connected online to KWS servers were set up.

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

One of the key activities the field of renewable energies lay in the development of training courses for the use of hydrogen in power generation. Since the growth of hydrogen usage is a highly important objective of Germany's energy policy, partnerships were founded to help establish KWS as a training provider in this field.

Overall demand in the area of thermal waste treatment was again very high. There is much call for the new training courses specifically adapted to this branch of the power industry. Various members react to market demands by enacting change and optimization measures. KWS assists such measures at the operations and shift crew 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 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
Board of Directors

Monika Bartels
Board of Directors

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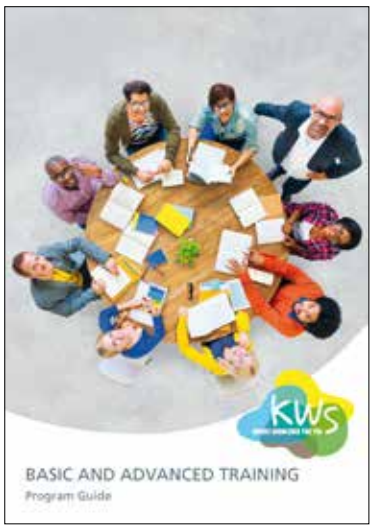


Performance in 2023

Services of KWS Energy Knowledge eG: An overview

The range of KWS's services is best described with the terms basic training, continuing education, advanced training, qualification and consulting. KWS's training offerings operate within the legal framework of Germany's Vocational Training Act, the Ordinance on Industrial Safety and Health, and the 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 pers-onnel. Organization development 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, 2023	Courses conducted	Number of Participants	Number of Participant Days
Conventional Power Plant Technology	108	1.534	43.914
Nuclear Technology/Radiation Protection	30	229	1.113
Simulator Training	120	488	2.005
Organization Development	3	3	6
Renewable Energies	9	88	458
International Activities	4	43	331
Total	**274**	**2.394**	**47.827**

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 are increasing, as both technical and social skills are cornerstones of the modern requirements profile for employees. The concept of lifelong learning is part of working life, especially in a complex technical environment like a power plant. Many outside forces affect the flexible design of power generation, a fact that is reflected by short- and medium-term personnel demands. KWS conducts professional and practical courses and training for these personnel demands.

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, 2023	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Operators	15	356	14.777
Power Plant Shift Supervisors – Production	14	237	14.379
Power Plant Shift Supervisors – Production Electrical and Control Engineering	5	93	3.047
Thermal Waste Treatment (TWT)	15	164	6.579
Advanced Training Measures	34	489	3.246
Customer-Specific Advanced Training Measures	25	204	1.886
Total	**108**	**1.543**	**43.914**

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

Plant Attendants
123rd training course (Essen/Germany)
Module Basic with 26 participants
Module Steam Generation with 26 participants
Module Turbines with 24 participants

124th training course (Essen/Germany)
Module Basic with 48 participants
Module Steam Generation with 47 participants
Module Turbines with 48 participants

21st training course (Gernsbach/Germany)
Module Basic with 25 participants
Module Steam Generation with 25 participants
Module Turbines with 23 participants

Plant Operator TWT
10th training course with 23 participants
11th training course with 28 participants

Power Plant Operators
131st training course with 60 participants
132nd training course with 30 participants
132nd training course with 25 participants
133rd training course with 59 participants

KWS-certified Operator Production for EEW Energy from Waste GmbH
10th training course with 18 participants

Power Plant Shift Supervisors – Production
145th training course with 19 participants
146th training course with 30 participants

Power Plant Shift Supervisors – Production Electrical and Control Engineering
51st training course with 11 participants

Power Plant Shift Supervisors – Thermal Waste Treatment
4rd training course with 9 participants

Nuclear Technology/Radiation Protection

Nuclear Technology training is three-pronged:

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

The training lineup comprises officially required 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, 2023	Courses conducted	Number of Participants	Number of Participant Days
Power Plant Shift Supervisors – Radiation Protection	1	4	20
Nuclear Basics	1	12	600
Skill Retention	2	30	30
Skill Acquisition in Radiation Protection	3	26	280
Special Courses Nuclear Technology/Radiation Protection	23	157	183
Total	**30**	**229**	**1.113**

Simulator Training

The KWS simulators are utilized to practice efficient power plant operations under normal operating conditions as well as handling malfunctions effectively. In addition to safe plant operations, process engineering technology interaction is immersively trained, if so required. The simulators facilitate quick, easy, and safe familiarization with current process engineering systems. By being able to deal with critical plant scenarios in this risk-free simulator 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, 2023	Trainings conducted	Number of Participants	Number of Participant Days
Simulator for Fossile Fired Power Plants	3	10	46
Thermal Waste Treatment (TWT)	1	7	28
Lignite 600/1100 MW	77	312	1.293
Hard Coal 800 MW	20	85	285
Hard Coal 1100 MW	8	32	163
CCGT 750-3 (SPPA-T2000)	3	13	65
CCGT 750-3 (SPPA-T3000)	8	29	125
Total	**120**	**488**	**2.005**

Construction Committee "Simulator for Lignite-Fired Power Plants"

The Construction Committee "Simulator for Lignite-Fired Power Plants" was founded in 2008 for the implementation of the respective simulator. Since then, the committee has been assisting and advising KWS in carrying out and developing the different variants of the lignite simulator.
During the report period, the committee convened for its 36th session on November 13, 2023. The focus is on evolving the BoA 3 simulator variant for the training goal of skill retention. Control engineering upgrades and the integration of existing systems into main control engineering in the reference installations make it necessary to adopt a current control engineering code in the simulator so that future simulator training can be conducted with state-of-the-art automation. Elements from the field of cybersecurity are to be introduced in simulator training to create operator awareness for this topic and to act accordingly when necessary.

Organization Development

All of KWS's members act within the framework of ongoing political, economic, and social change. Additional challenges arise from interaction between staff, business partners, and clients. Here, KWS is on hand to assist interested parties with issues like personnel selection, team development, organization development, conflict management, and management personnel coaching. The energy market will continue to evolve in the future and trigger major changes in many businesses. Therefore, our organization development team will be the go-to contact for assisting business with organizational changes.

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

January 01 – December 31, 2023	Courses/Measures conducted	Number of Participants	Number of Participant Days
OD Consulting and Workshops	3	3	6

Renewable Energies

Hydropower:
Demand for base and immersion courses has been steady both in terms of enquiry and execution.
Wind power:
Demand for electrotechnology qualification measures and WindTrainingTower rental have been going up. A long-term cooperation with windhunter academy GmbH is being pursued. Thanks to the use of the KWS laboratories, the electrotechnology training workshop and the WindTraining-Tower, joint practice-oriented wind power industry qualification measures are to be implemented.
Hydrogen:
The "Basic Hydrogen Technology Skills" seminar was held several times both at KWS and at customer sites. Other seminars, like "Power Plant Technology For Engineers", saw the integration of hydrogen-related topics as well. The supervision of future projects was particularly labor-intensive. The multi-stage application process for the representative basic and advanced training center for hydrogen in Duisburg, Germany, required many coordination talks with the project partners.

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

January 01 – December 31, 2023	Courses conducted	Number of Participants	Number of Participant Days
Renewable Energies	9	88	458

International Activities

In 2023, KWS participated in several international activities. One standout was our involvement in the vgbe OPERA project that subjected the South African power provider to an assessment. KWS takes part in the assessment along with vbge, RWE, STEAG, and Dornier, and was in charge of the area of "Skills and Knowledge" for the 14 hard coal power plants concerned. The report serves to improve the performance of the power plant fleet.
KWS also conducted a 15-day BOT (Basic Operation Training) at the Jhang installation in Pakistan. New staffers scheduled to take over operations of the CCGT plant after its commissioning were instructed.
Furthermore, KWS conducted a training measure/workshop for 15 Indonesian power grid engineers at the KWS Energy Campus in Essen, Germany, in collaboration with RWE.

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

January 01 – December 31, 2023	Courses conducted	Number of Participants	Number of Participant Days
International Activities	4	43	331

Organization

Board of Supervisors

The Board of Supervisors is tasked with monitoring the Board of Directors' management of KWS. Its job is to examine the annual financial statement, the status report, and the use of the annual net profit and to convey the results of its examination to the General Assembly. The Board of Supervisors directs the General Assembly that approves the annual financial statement and the investment, financial and business plan. Furthermore, the Board of Supervisors appoints and recalls the Board of Directors.

The Board of Supervisors convened twice during the report period:
7th meeting May 15th, 2023
8th meeting December 1st, 2023

Altmann, Hubertus, (Chairman)
Member of the Board of Directors
of Lausitz Energie Kraftwerke AG/
of Lausitz Energie Bergbau AG, Cottbus/Germany
(until June 2023)

Giehl, Martin
Member of the Board of Directors of Mainova AG and
Frankfurt/Germany
(chairman from July 2023)

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

Bockamp, Stefan, Dr.
Director Growth Engineering Uniper/Managing Director Uniper
of Uniper Technologies GmbH, Düsseldorf/Germany

Hacheney. Carsten
Director Transformation of RWE Power AG, Essen
(from June 2023)

Lücker, Guido
Technical Manager
of EEW Energy from Waste Hannover GmbH,
Hannover/Germany

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

Waniek, Jörg
Member of the Board of Directors
of Lausitz Energie Kraftwerke AG/of Lausitz Energie Bergbau AG,
Cottbus/Germany
(from June 2023)

Board of Directors

Ernst Michael Züfle Monika Bartels

Financial and Legal Committee

The Financial and Legal Committee of KWS Energy Knowledge eG assists and advises the Board of Supervisors and the Board of Directors in all financial and legal matters.
The committee discussed the audit report which was compiled by Genossenschaftsverband – Verband der Regionen e.V. on the financial statement for 2022, the review of operation including the attachment and recommended that the board approve KWS's financial statement for 2022 as is.
Consultation of the economic, investment and financial plans for the business year 2024 was carried out by the Financial and Legal Committee. It recommended to the Board of Supervisors that it submit them in the General Assembly in 2023.
The Financial and Legal Committee also concerned itself with with the plans for the construction of an education center for hydrogen.

The following activities took place during the report period:
70th meeting April 17th, 2023
71st meeting September 25th, 2023

Schlingensiepen, Daniel (Chairman)
RWE Nuclear GmbH, Essen/Germany

Hauleitner, Andrea
VERBUND Hydro Power GmbH, Vienna/Austria
(from May 2023)

Ketterer, Marcel
EnBW Energie Baden-Württemberg AG, Karlsruhe/Germany
(until March 2023)

Pollak, Torsten
EnBW Baden-Würtetemberg AG, Stuttgart/Germany
(from May 2023)

Schönbrunn, Thomas
Lausitz Energie Bergbau AG, Cottbus

Schulze-Darup, Martin
Uniper Kraftwerke GmbH, Düsseldorf/Germany
(from May 2023)

Sennekamp, Peter
Uniper Kraftwerke GmbH, Düsseldorf/Germany
(until March 2023)

Sous, Martin
Mainova AG, Frankfurt/Germany

Training Committee

The KWS Training Committee advises and assists the Board of Supervisors and Board of Directors 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 147th and 148th Power Plant Shift Supervisor–Production training course, and those of the 4th Power Plant Shift Supervisor–Thermal waste treatment 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,
- Impact of the energy crisis on continuing and advanced training.

The Training Committee convened twice during the report period:
139th meeting June 15th, 2023
140th meeting December 7th, 2023

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

Kurzmann-Friedl, Christof, DI (Deupty Chairman)
VERBUND Thermal Power GmbH & Co KG,
Dürnrohr Location, Zwentendorf/Austria

Ahmann, Maria
RWE Generation SE, Emsland Power Plant, Lingen/Germany

Dünster, Frank
RWE Generation SE, Industrial Power Stations Duisburg-Huckingen/Gersteinwerk Power Plant, Duisburg/Werne/Germany

Fielenbach, Christian, Dr.
RWE Power AG, Bergheim/Germany

Iven, Franz-Wilhelm
Ministry for the Economy, Industry, Climate Protection and Energy of the State of Northrhine-Westphalia, Düsseldorf/Germany

Kirstein, Klaus-Dieter
KDK Consulting, Düsseldorf/Germany

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

Kunz, Christoph
Siemens Energy Global GmbH & Co. KG, Munich/Germany

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

Paus, Christoph
UNIPER SE, Essen/Germany

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

Stenzel, Oliver
Lausitz Energie Kraftwerke AG, Schwarze Pumpe Power Plant, Spremberg/Germany

Then, Oliver, Dr.
vgbe energy e.V., Essen/Germany

Tschersich, Conrad
AWG Abfallwirtschaftsgesellschaft mbH Wuppertal, Wuppertal/Germany

Volkmann, Peter
Grosskraftwerk Mannheim Aktiengesellschaft, Mannheim/Germany

Von Gehlen, Sebastian, Dr.
PreussenElektra GmbH, Emmerthal/Germany

Wagner, Karsten
EnBW Energie Baden-Württemberg AG, Karlsruhe/Germany

Ernst Michael Züfle
KWS Energy Knowledge eG, Essen/Germany

Consultant:
Nina Woydack
KWS Energy Knowledge eG, Essen/Germany

Facts and Figures

Members

KWS Energy Knowledge eG Membership

KWS Energy Knowledge eG is a partnership of power industry companies. It strives to promote and assist the businesses of its members through basic and advanced training events for expert operations and management personnel of installations dedicated to power and/or heat generation and supply, heat extraction and desalination by maintaining locations for holding such events and conducting examinations as well as offering room and board for trainees. The cooperative assists its members within the framework of said vocational training in the area of environmental protection, in pollution control and water conservation, and also in the field of occupational health and safety and accident prevention. Furthermore, it acts as consultant for personnel and organization development.
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.kws-eg.com" or "international.kws-eg.com".

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
AVG Abfallentsorgungs- und Verwertungsgesellschaft Köln mbH, Cologne

Basell Polyolefine GmbH, Wesseling Site, Wesseling
BASF SE, Ludwigshafen
Bayer AG, Berlin (Group Membership)
Berliner Stadtreinigungsbetriebe, Abfallbehandlungswerk Nord, Berlin
Biomasse-Kraftwerk Fechenheim GmbH, Frankfurt am Main
Boehringer Ingelheim Pharma GmbH & Co. KG, Ingelheim am Rhein
Bremerhavener Entsorgungsgesellschaft mbH, Bremerhaven
BS|Energy Braunschweiger Versorgungs-AG & Co. KG, Braunschweig

Cargill Deutschland GmbH, Krefeld
Cerdia Produktions GmbH, Freiburg
CURRENTA GmbH & Co. OHG, Leverkusen

Deutsche Windtechnik X-Service GmbH, Erkelenz
DREWAG Stadtwerke Dresden GmbH, Dresden
DSM Nutritional Products GmbH, Grenzach-Wyhlen
DS Smith Paper Deutschland GmbH, Aschaffenburg (Group Membership)

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 Wasser Potsdam GmbH, Potsdam
Energie- und Wasserversorgung Bonn/Rhein-Sieg GmbH (SWB), Bonn
Energieversorgung Oberhausen AG, Oberhausen
Energieversorgung Offenbach AG, Offenbach
Engie, Engie Towers Brüssel, Brussel/Belgium
ENTEGA 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 Energiewerke GmbH, Hamburg
Hamburger Stadtentwässerung AöR, Hamburg
HEB GmbH, Hagener Entsorgungsbetrieb, Hagen
Henkel AG & Co. KGaA, Düsseldorf
Holzheizkraftwerke Cuxhaven Anlagengesellschaft mbH & Co. KG, Cuxhaven

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
(Group Membership)
Kämmerer Energie GmbH, Osnabrück
Kernkraftwerk Gösgen-Däniken AG, Däniken/Switzerland
Knapsack Power GmbH & Co. KG, Düsseldorf
Kraftwerke Mainz-Wiesbaden AG, Mainz-Wiesbaden
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 GmbH, 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
Nordland Papier GmbH, Dörpen
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, Ruhrchemie Site,
Oberhausen

Powerplant Rotterdam B.V.,
A member of the ONYX Power Group,
LB Maasvlakte Rotterdam/Netherlands
PreussenElektra GmbH, Hanover
PreZero Energy GmbH, Bernburg

Raubling Papier GmbH, Raubling
RheinEnergie AG, Köln
RWE AG, Essen
Group Membership for
- RWE Generation SE
- RWE Nuclear GmbH
- RWE Generation NL B.V., Netherlands
- RWE Generation UK plc, Didcot B CCGT Power Station,
Oxfordshire/Great Britain

Saale Energie GmbH, Schkopau
Salzburg AG, Salzburg/Austria
Salzgitter Flachstahl GmbH, Salzgitter
Sappi Austria Produktions-GmbH & Co. KG, Gratkorn/Austria
Sappi Ehingen GmbH, Ehingen
Schluchseewerk AG, Laufenburg
SEO Societe Electrique De l´Our S.A.,
Centrale Vianden, Stolzembourg/Luxembourg
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 Bielefeld GmbH, Bielefeld
Group Membership for
MVA Bielefeld-Herford GmbH
Enertec Hameln GmbH
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
Stadtwerke Würzburg GmbH, Würzburg
Städtische Werke Energie + Wärme GmbH, Kassel

STEAG GmbH, Essen
Group Membership for
RKB Raffinerie-Kraftwerks-Betriebs GmbH, Essen
Gemeinschaftskraftwerk Bergkamen A OHG, Bergkamen
Stora Enso Maxau GmbH, Karlsruhe
swb Entsorgung GmbH & Co. KG,
Müllheizwerk Bremen, Bremen
swb Erzeugung AG & Co. KG, Bremen
SWM Services GmbH,
Strom- und Wärmeerzeugung, Unterföhring
SWP Stadtwerke Pforzheim GmbH & Co. KG, Pforzheim

TEAG Thüringer Energie AG, Erfurt
Technische Betriebe Solingen (TBS), Solingen
Thermische Verwertungsanlage Schwarza (TVS),
Eigenbetrieb des Zweckverbandes
Abfallwirtschaft Saale-Orla, Pößneck
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, Hannover

Vattenfall Europe Nuclear Energy 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

WIEN ENERGIE GmbH, Vienna/Austria
WSW Energie & Wasser AG, Wuppertal

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/Germany
GfS Gesellschaft für Simulatorschulung mbH, Essen/Germany
h2-netzwerk-ruhr e.V., Herten

Kerntechnik Deutschland e.V., Berlin/Germany
Technical University of Munich/Germany,
FRM II: Research Neutron Source Heinz Maier-Leibnitz,
Garching
vgbe energy e.V., Essen/Germany
VIK Verband der Industriellen Energie- und Kraftwirtschaft e.V.,
Berlin/Germany

Sponsoring Members

GESTRA AG, Bremen
KONRAD Meß- & Regeltechnik GmbH,
Gundremmingen/Germany
OffTEC Base GmbH & Co. KG, Enge-Sande
SHE Solution Bergmann GmbH & Co. KG, Enger
Siemens Gas and Power GmbH & Co. KG, Essen
(Group Membership)
S.T.E.P. Consulting GmbH, Aachen/Germany

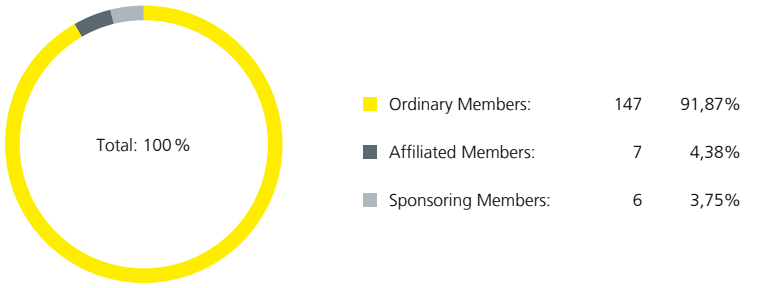
Membership Development

On December 31st, 2023, the KWS Energy Knowledge eG had 160 members, 147 of which were ordinary, seven were affiliated and six were sponsoring members.
During the report period, three companies joined KWS as ordinary members and one company as an affiliated member. In addition, five members (four ordinary, one affiliated) left KWS.
In accordance with the membership contribution ordinance, individual membership fees are assessed based on net nominal installed electrical capacity in megawatts as listed by the German Federal Network Agency.
The total amount of installed electrical capacity of all ordinary members during the report period stands at 78,931 MW.

18 member companies are based outside of Germany, namely:
- eleven companies in Austria,
- three companies in Belgium,
- one company in Luxembourg,
- two companies in the Netherlands,
- one company in Switzerland.

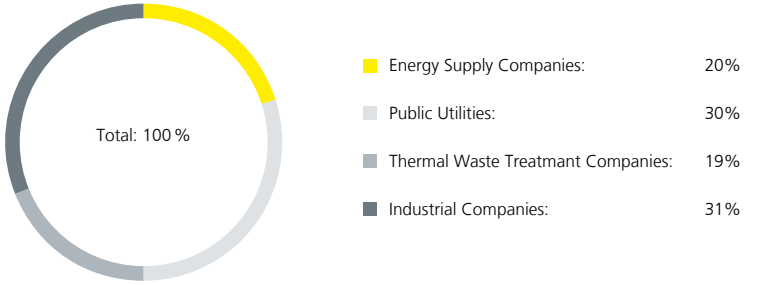
The net nominal installed electrical capacity of the foreign member companies adds up to 21,085 MW or approximately 27 % of the total amount of all ordinary members.

MEMBERS



Listing of all members (As at December 31st, 2023) Fig. 1

COMPOSITION OF THE GROUP OF ORDINARY MEMBERS



Listing of all ordinary members (As at December 31st, 2023) 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	103	70,07	4.879	6,18
251–500 MW	14	9,52	4.926	6,24
501–1.000 MW	11	7,48	7.757	9,83
1.001–2.500 MW	13	8,84	18.765	23,77
2.501–5.000 MW	1	0,68	2.781	3,52
5.001–8.500 MW	3	2,04	21.984	27,85
above 8.500 MW	2	1,36	17.839	22,60
Total	**147**	**100,00**	**78.931**	**100,00**

KWS in General

2023 General Assembly

Mr. Hubertus Altmann, Chairman of the Board of Supervisors, chaired the 2023 General Assembly, which was conducted in a hybrid format. 30 members took part: Nine in person, two of which acting as authorized representatives, and 21 by video¬conference.

The agenda comprised the following topics:

1. Opening and address of welcome
2. Report of the Board of Directors on the 2022 business year
3. Report of the Board of Supervisors' activities
4. Report on the result of the mandatory audit and pertinent statement of the Board of Supervisors
5. Approval of the annual statement of accounts for 2022 and decision on the appropriation of net income
6. Discharge from liability of
   a) The Board of Directors
   b) The Board of Supervisors
7. Report of the Board of Directors on the 2023 business year and the strategic business area of hydrogen
8. Release of the investment, financial, and business plans submitted by the Board of Directors
9. Changes to the statute
10. Elections for the Board of Supervisors
11. Various topics

All resolutions were approved by the respective majorities necessary. The General Assembly and the Board of Directors expressed their deep gratitude to Mr. Altmann for his very successful work as Chairman of the Board of Supervisors.
As a symbol of appreciation, his 13-year commitment was rewarded with KWS's Badge of Honor in gold.

Ernst Michael Züfle, Hubertus Altmann, Monika Bartels (f.l.t.r.)

New simulator for TWT installation available at KWS

In June 2023, KWS acquired a simulator for thermal waste treatment (TWT) plants at Powerspex, Hengelo, Netherlands. Two variants will be available for the simulator.
The operating and monitoring system is patterned after the Siemens SPPA-T3000 control engineering system and permits tracking signals in logic diagrams and provides insight into the process model during simulator training. The simulator variants emulate different flue gas treatment installations (SCR, SNCR) and feature a district heating system and process steam extraction. A pilot training has already been conducted with customers and a course program has been developed based on the results. Possible improvements for simulator evolution have been presented.

Renewable Energies

Hydrogen

KWS Energy Knowledge eG plays a leading role in the development of new educational offerings in Germany. These continuation and advanced training options are a decisive factor in the growth of the industry, particularly within the framework of Germany's national hydrogen strategy and the European Union's hydrogen strategy.
The German government's national hydrogen strategy pursues ambitious goals, among them the creation of a powerful hydrogen economy by 2030. Its goal is to install up to 5 gigawatts of electrolyzer capacity for green hydrogen and to offer competitively priced hydrogen by 2040. In addition, Germany is to become climate neutral by 2050, with hydrogen playing a key role as an energy source in various sectors like industry, transportation, and heating for buildings.
KWS is actively engaged in this field, especially through the establishment of the H2 Training Center in Duisburg, Germany. This center is a groundbreaking project in qualifying expert personnel for hydrogen technology. It offers state-of-the-art training infrastructure including laboratory environments and real-life installations for the purpose of creating practical training choices. Targeted instruction programs qualify expert personnel for the planning, construction, and operations of hydrogen installations, driving technological evolution and establishing the infrastructure necessary for an efficient hydrogen economy.

KWS thereby contributes to the achievement of the national hydrogen strategy goals by training skilled individuals needed for the implementation and operation of hydrogen projects. This not only assists technological innovation, but also the implementation of hydrogen solutions that contribute to meeting Germany's and the EU's climate protection objectives.

Wind

In the area of wind power, KWS is intensely engaged in the training of technical personnel for maintenance and operations of wind power installations. As Germany's energy transformation progresses, wind power plays a decisive part in the blend of renewable energies. In order to utilize these potentials to the full and to meet the national climate goals, highly qualified individuals are needed to operate, service and, when necessary, repair wind power installations efficiently.
KWS's training programs aim at giving technical personnel practical, hands-on instruction. A core component of such instruction is the training tower, which is specifically designed to convey the risks and challenges involved in working at wind power installations.
High altitude safety training in accordance with DGUV and GWO standards can be found in this field. Such training contributes to accident prevention and increased maintenance personnel safety.
Given the shortage of skilled labor in the wind power industry, basic and advanced training of qualified personnel is crucial. KWS makes a determined effort to close this gap by offering customized training measures tailored to the specific needs of the industry and by actively collaborating with businesses in this branch of trade.

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. To make sure that the system does not gather dust on the shelf, but determines and sustainably assists our actual workplace efforts, it was designed by KWS itself and is constantly evolving. While the management provides a general framework and concept, a multitude of staffers worked out concrete processes and procedures. This lays the groundwork for high acceptancy and sustainable application.
The second monitoring audits in accordance with DIN EN ISO 9001:2015 standard and AZAV license (Accreditation and Licensing Ordinance for the Promotion of Employment) took place from November 8th – 9th, 2023.

The audit criteria derive from quality management system requirements, the AZAV Accreditation and Licensing Ordinance, the recommendations from the accreditation advisory board on the AZWV of May 23rd, 2011, and the recommendations of the board in accordance with Sec. 182 SGB III in its respective current version. The scope of application encompasses advanced training in the field of power plant technology, simulator training, and organization development.

The audits conducted pursued the following objectives:
- Assessment of conformity of the management system of the client in full or in part with the audit criteria listed above
- Assessment the fitness of the management system, ascertainment of meeting applicable legal, regulatory, and contractual requirements, albeit the audit does not rate compliance with legal provisions
- Evaluation of the effectiveness of the management system with regard to making sure that the client's organization meets its stated goals lastingly and
- where applicable, identifying areas for possible management systems improvements
- Revision of compliance with AZAV requirements

Audit result:
- The audit found no deviation from the ordinance- and handbook-compliant implementation status of DIN EN ISO 9001:2015 as well as the AZAV ordinance.
- Potential points of improvement were identified.
- The QM documentation is well-regulated and available to all parties involved.
- Acceptance of the QM system by all parties involved is a fact.
- The QM system is developed further and consistently applied with regard to its implementation.
- A total of 12 individuals were interviewed. The selection of the individuals audited reflects a representative overview of business processes in the respective locations.
- 121 documents and pertinent processes were reviewed.

Improvements suggested will be implemented in 2023.
The AZAV audit result confirms that KWS consistently continues to meet the requirements for government- sponsored 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 cult~~ivate existing contacts, make new ones and get fresh impulses for ist ongoing evolution.

During the report period, KWS Energy Knowledge eG was present at the following trade fairs and conventions:

- 02nd Hydrogen Industry Day, Weimar/Germany
- 03rd Hydrogen Industry Day, Gelsenkirchen/Germany
- Enlit Africa 2023, Cape Town/South Africa
- E-world energy & water, Essen/Germany
- 15th North Rhine-Westphalia Wind Energy Industry Day (Branchentag Windenergie NRW), Gelsenkirchen/Germany
- KONTEC 2023, Dersden/Germany
- HUSUM Wind 2023, Husum/Germany
- 54th Colloquium on Power Plant Technology (Kraftwerkstechnisches Kolloquium), Dresden/Germany
- 35th VDI-/ITAD-Symposium "Thermial Waste Treatment", Würzburg/Germany
- 31st Wind Energy Days, Linstow/Germany

Awarding the Badge of Honour

The KWS Energy Knowledge eG 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.

In 2023 the general assembly of KWS awarded its **gold** badge of honor to:

Mr. Hubertus Altmann
-former Chairman of the Board of Supervisors

In 2023 the general assembly of KWS awarded its **silver** badge of honor to:

Mr. Markus Bieder
- Chairman of the Training Committee

Mr. Andreas Hermann
- Lecturer

Mr. Dr. Dariush Hourfar
- Lecturer

In 2023 the general assembly of KWS awarded its **bonze** badge of honor to the following lecturers:

- Markus Bartl
- Ernst Ertl
- Dr. Herbert Lindner
- Peter Probst
- Denis Stegemann
- Christoph Van Eyk
- Helmut Wank

Awarding of the badge of honour on Dezember 11th, 2023

Delegations/Visitors

On August 17th, 2023, a group of 11 individuals from LANUV, the agency for nature, the environment, and consumer protection of the German state of North Rhine-Westphalia paid KWS Energy Knowledge eG a visit. On occasion of a works outing, the agency employees learned about the layout and operation processes of a power plant as well as the specific demands posed by power plant operations on power plant engineers and the instruction they receive by means of a simulator.
An exciting voyage through the world of power plant technology awaited a delegation from India during their call on a KWS Energy Knowledge eG power plant simulator. The simulator offered the visitors a realistic image of the challenges and solutions facing modern power plants, particularly flexible operations in a fluctuating power grid. Two intense days full of practical experiences conveyed a broad spectrum of insights to the participants, from rapid startup and quick load changes

to plant operations with malfunctioning or failing assemblies. Acting as control room operators, the participants experienced the interaction between process and control engineering technology and operational practice very closely. This life-like simulator event was made possible by the collaboration between KWS eG, GIZ, Germany's key development agency, the Indian Excellence Enhancement Center, and vgbe Energy Service LLC of Essen, Germany. The trip also offered visits to German power plants to round off the experience. The encounter was more than a mere exchange of knowledge - it was a step toward a sustainable energy future, marked by international cooperation and innovation.

LANUV at KWS

Apartment Building

The apartment building with its 55 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.
Featuring an innovative energy concept, this architecturally successful object blends in perfectly with its Deilbachtal surroundings and complements the Energy-Campus Deilbachtal.
The demand for apartments has returned to the level as it was before the corona pandemic. Therefore an occupancy rate of 87.2 % was achieved.

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 4 times by external hosts of seminars or conventions.

Inside view of conference room

KWS Energy Knowledge eG

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