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METEOROLOGICAL
ORGANIZATION



UNECE



WEMC
World Energy &
Meteorology Council

DKU DEUTSCH
KASACHISCHE
UNIVERSITÄT



WORLD BANK GROUP



EUROPEAN UNION

CAWEP
CENTRAL ASIA WATER & ENERGY PROGRAM



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
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Weather & climate services for the energy sector in Central Asia: Training course for practitioners and policymakers

21 February – 4 March, 2022

Summary Review

Background

The energy sector needs a variety of hydrometeorological services to support decision-making for both day-to-day operations and for longer-term strategic planning, as weather and climate variables affect both energy demand and supply. Weather and climate services can be utilised to maximise efficiency, economic viability and public acceptance of both supply and demand-side management of energy systems.

Central Asia is endowed with abundant and diverse energy resources. However, countries in the region largely rely on carbon-intensive energy sources, with an untapped renewable energy potential. Kazakhstan, for example, has embarked on an energy transition, shifting away from coal to more sustainable, low-carbon options. However, the share of renewable energy generated in the country was below 2% in 2020, with policy targets for renewables to increase to 10% in 2030 and 50% by 2050. Most countries in the region have likewise mandated renewable energy goals, aiming to shift away from reliance on their coal and natural gas supplies for power generation. However, significant infrastructure, investment, planning, operations, policies and governance efforts are needed to achieve these targets.

As such, this first known online training course to bring together experts in energy and hydrometeorology from across Central Asia and the international community was specifically designed for the renewable energy information needs of Central Asia's practitioners and policymakers, to expose them to climate and weather tools to guide their clean energy transition.

Objectives

The course sought to:

- Create awareness and enhance knowledge about the design and application of weather and climate services for the energy sector in Central Asia.
- Build capacity on the application of weather and climate services for net-zero energy transitions in the Central Asian region, leveraging international climate finance.
- Showcase how climate data, such as that provided by the World Energy & Meteorology Council's (WEMC) [Teal Tool](#), can be used to inform smart, clean energy transition, in the context of policy and industry.
- Foster a dialogue and partnerships between the hydrometeorological and energy communities in the region, to address major energy challenges in upcoming years.

Practical goal

The practical goal of the course was for participants to learn how to develop and apply weather and climate services for the energy sector. Practical group work was an integral part of the sessions.

Target audience

The target audience included policymakers, energy company practitioners, hydrometeorological services, NGOs and academics, as well as and other interested stakeholders from Central Asia and beyond.

Course structure

The course was comprised of a mix of lectures, panel-type discussions and practical group exercises. Examples of the presentations produced during group work are shown below. The training course was held over 2 weeks, with twice weekly 3.5 hour sessions (for a total of 21+ hours).

Venue and date

While officially hosted in Almaty, Kazakhstan, the course was held online, with the following sessions (all 9:00 – 12:30 UTC / 15:00 – 18:30 Almaty time):

- Session 1 (21.02.22): Why weather and climate services matter for energy management
- Session 2 (23.02.22): What is needed for delivering weather and climate services
- Session 3 (25.02.22): How to design a climate service
- Session 4 (28.02.22): Applying weather and climate services for the energy sector
- Session 5 (02.03.22): Applying weather and climate services for the energy sector with connections to water and agriculture/food (the 'nexus')
- Session 6 (04.03.22): Concluding thoughts and participants presentations

The detailed agenda is included in Annex 1.



Speakers` profile

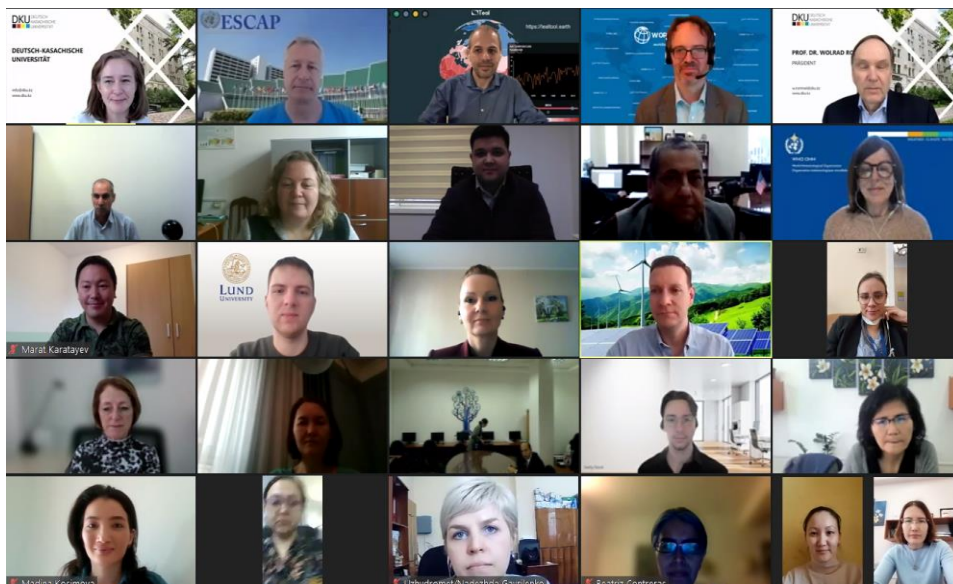
The speakers of the training course comprised a diverse pool of experts from international organizations, academic institutions, commercial firms and local professionals. Names and affiliations of the speakers can be found in Annex 2.

Proceedings

Session 1: Why weather and climate services matter for energy management?

In this session, the need for weather and climate services in the energy sector, how they can be applied in the region, and possible challenges to their uptake were explored. Following a welcoming and introducing the participants to the program and course structure, speakers described weather and climate services and demonstrated how they are valuable for the energy sector. Presentations on the current status and emerging

trends of the energy sector in Central Asia were then followed by a panel session discussion on “Weather and climate services for supporting energy transitions in Central Asia: local barriers and opportunities”. Panelists from different backgrounds outlined opportunities and challenges to the uptake of weather and climate services to support energy transitions in the region.



Group Photo

Session 2: What is needed for delivering weather and climate services?

The goal of the session was to build understanding of the steps for building weather and climate services through the hydrometeorological service value chain. Speakers explored the perspectives of the National Hydrometeorological Services on the uptake of weather and climate services in the energy field. Following this, the course’s practical exercise was introduced to the participants, namely the planning and designing of an energy weather/climate service for the participants’ country/company and the process of creating a mini-proposal for a weather/climate service.

Session 3: How to design a climate service

The session first explored collaborative approaches to weather and climate services, followed by group work described in more detail below. During the latter stages of the session, weather and climate forecasting for energy applications in the region was presented.

Session 4: Applying weather and climate services for the energy sector

Different sources of data for the development of weather and climate services in the energy sector were explored, such as Copernicus C3S¹, the Global Solar² and Wind Atlas³. Following this, case studies showing the application of climate services in the energy industry were presented. The final hour of the session was dedicated to group work.

¹ <https://cds.climate.copernicus.eu/cdsapp#!/dataset/10.24381/cds.4bd77450?tab=overview>

² <https://globalsolaratlas.info/>

³ <https://globalwindatlas.info/>

Session 5: Applying weather and climate services for the energy and related sectors

The session started by exploring insurance and financial hedging for energy and agriculture. This was followed by a panel discussion on weather and climate services for risk management and net-zero infrastructure where both panellists and participants explored what is required to support weather and climate services for the net-zero transition and low-carbon investment. The final hour was dedicated for group work where teams finalized their proposals for weather and climate services.

Group work organization

Break-out groups consisting of 8-10 participants were formed at the end of Session 2. Facilitated by a mentor, participants planned the development of a specific weather and/or climate Service for the energy sector in their region/area (the guidelines document is attached).

During the first group work session, participants selected their specific service to be developed as a team. All the groups' proposals were presented during Session 6. Preparation of the proposals and their presentations also required interactive work outside of the allocated break-out group slots.

Course results: group presentations

The group presentations were planned as a team activity to encourage sharing of ideas, and to foster a healthy and friendly competition amongst the teams. The selection of groups was made considering the participants' professional experience: each group had a mixture of academics, meteorologists and energy engineers. Therefore five groups were formed to prepare proposals for an energy climate and weather service specifically tailored for their country/region. The following proposals were developed:

Tajikistan group: "Co-designing and co-producing of a seasonal forecast for hydropower reservoir. Cooperation between Pamir Energy and National Hydrometeorological Service of Tajikistan". This was prepared by representatives of Pamir Energy and academics while mentored by WMO and Kazhydromet staff.

Uzbekistan group: Establishing the Central Asian open data platform, considering resource interaction on the use of NEXUS for the long term until 2030–2040–2050–2100. This was prepared by academics from Kazakhstan and representatives of the energy sector in Uzbekistan.

Kazakhstan group: Providing an accessible meteorological service to improve the efficiency of water use in irrigation. This was prepared by academics from Kazakhstan.

Turkmenistan and Kyrgyz Republic group: Water use efficiency (particularly on the Amu Dariya, Syr Dariya and Chu-Talas river basins) and expansion of the hydrological observational network in both countries in Central Asia.

English speaking group: Clean energy transition challenges and opportunities in Niger, prepared by an academic from Niger.

The group work was particularly beneficial in connecting the hydrometeorological practitioner community with the energy sector in Central Asia. During group discussions participants formed useful professional connections and shared their opinions on current

energy and agricultural issues in Central Asia. Working in a team helped the participants to identify potential measures and actions to address those issues from wider perspectives.

Graphical examples of the presentations from two of the groups:

Практический кейс: Казахстан

Статус-кво
 Ресурсное (NEXUS) взаимодействие
 Моделирование будущего воздействия
 Визуализация моделирования и формирование политики

Метеорологические и климатические услуги для энергетического сектора Центральной Азии: обучающий курс для специалистов отрасли

Uzbekistan group presentation

Problem description

General available historical Information for operation of the Pamir 1 Plant

- Water discharge – yearly forecast required
- Water quality
- The sediments
- The chemical composition of water

Required forecast information for this specific project

- Water discharge – seasonal to yearly forecast required
- Temperature – weekly to seasonal
- Precipitation - seasonally

Hydrological data

Location of the HPP Pamir 1

Gunt river water discharge, 2021 y.

Month	Water discharge (m³/s)	Plant discharge (m³/s)
1	42.9	0
2	39.6	0
3	38.4	0
4	45.0	0
5	100.8	0
6	239	0
7	347.7	0
8	331.2	0
9	203.0	0
10	79.2	0
11	68.4	0
12	48.3	0

The Gunt River yearly water discharge

Tajikistan group presentation

Participant course evaluation

During the 6th session an online survey was conducted among the participants to gather their opinions and feedback on the course. Results include:

What do you need most at online meetings compared to offline (live) meetings?

- Networking
- Coffee break discussions and personal discussions
- Live communication
- Hugs and handshakes
- Being able to read emotions/emotional connection

- Lack of technical issues
- Exchange of skills

How will you use the knowledge gained in this course?

- For graduation work
- For project work
- Use within a scientific article/research
- Will organise a round table
- Seek collaborations using tools and databases introduced.
- Share with colleagues
- Development of analytical documents

Which topic from the course did you find most useful?

- Good practice in delivering weather and climate services development for the energy sector – 1 vote
- Collaborative approaches to weather and climate services – 1 vote
- Weather and climate forecasting for energy applications in the region– 2 votes
- Case studies: applying climate services in the energy industry - 0 vote
- Sources of weather and climate data for the energy sector: Copernicus C3S, the Global Solar and Wind Atlas, etc – 2 votes
- Insurance and hedging for energy and agriculture) -1 vote

Professionally, what will be your role in promoting the transition to renewable energy sources?

- To assist the transfer to renewables
- Explain to students
- Participation in energy source development projects
- Organization of research events
- Try to develop this area using and introducing new advanced technologies.
- Planning and modeling (numerical modeling) of the effects of the transition to renewable energy in terms of water use optimization
- Promoting the transition to renewable energy sources
- Model the impact of climate change on the renewable energy potential in the region
- Participate in the policy and development of the transition to renewable energy sources
- Advise the government

What suggestions do you have for improving the course (eg adding/expanding/topics)?

- More practical work
- More water-food energy nexus
- Face-to-face discussion/offline format
- Panel meetings
- Working with platforms
- Accounting adaptation e.g. Irrigation
- Team building

Some comments from participants:

“This is the first training that has become a platform for dialogue and united the energy sector, meteorological services, and even attracted the field of education, because personnel are our everything! We thank everyone: organizers and participants for the efforts and initiative of holding for the countries of Central Asia! Sincerely, NHMS of the Republic of Kazakhstan.”

“Many thanks to the organizers, speakers and participants of this training, we learned a lot from this training.”

“The knowledge gained in this training gave us the opportunity to understand better the relationship between the energy center and the meteorological center. Since meteorological data are the basis for energy companies to plan maintenance and manage energy facilities.”

Participants' profile

The number of participants for each session is shown in Figure 1:

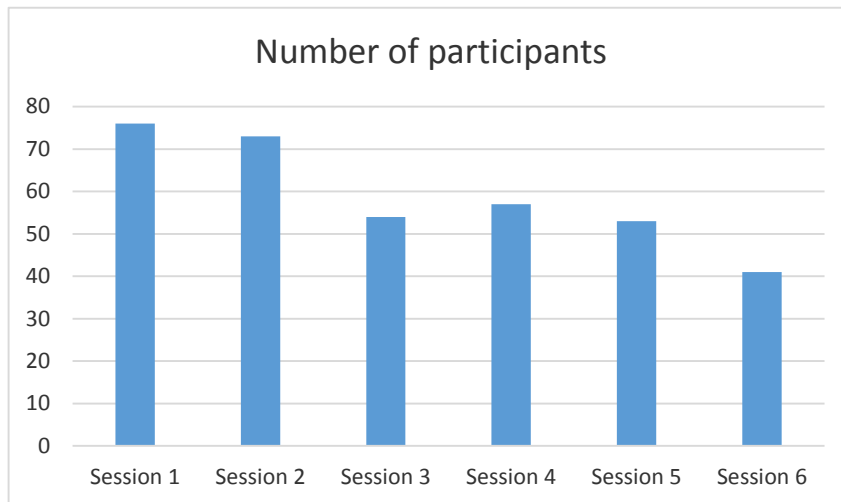


Figure 1. Number of participants by sessions

Disaggregation of participants is best illustrated and informative based on Session 6. During this session 41 persons (not including speakers/ moderators/ organizers) took part, with 18 women and 23 men (the list of participants is included in Annex 2). The distribution of participants by country is shown in Figure 2:

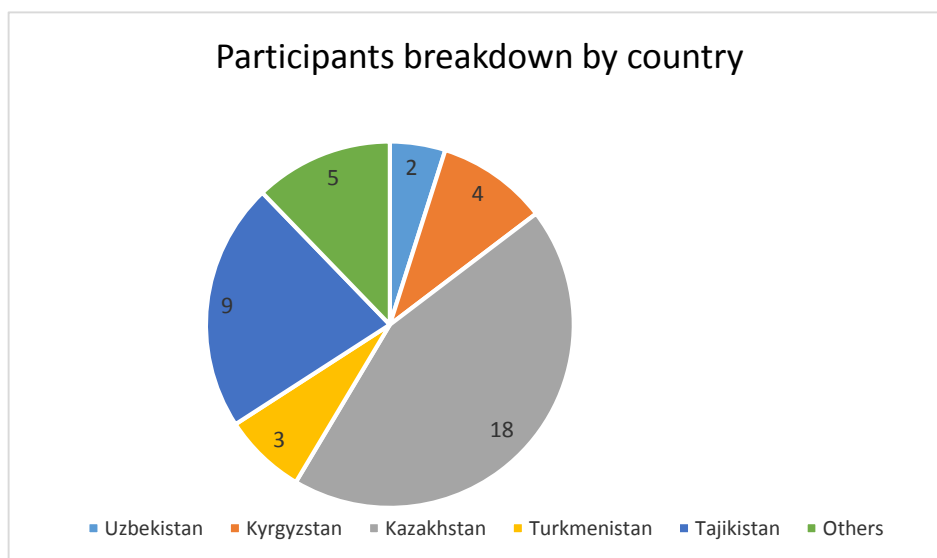


Figure 2. Participants breakdown by country

Lessons learnt

- Participants engage more proactively through group work, establishing connections and a basis for further networking.
- Some groups needed more time than others and therefore required more intense guidance from moderators.
- Moderators should be well prepared to guide and monitor team work.

Recommendations

Online courses with interactive group work should be conducted via learning electronic platforms where participants can have direct access to all materials and tools at any time during the course.

Annex 1 **AGENDA**

Session 1 (21.2.22): Why weather and climate services matter for energy management

Time	Title	Speaker	Objective
9:00-9:20 UTC	Welcome Address Chair: Barbara Janusz-Pawletta (DKU)	Wolrad Rommel (DKU), Alberto Troccoli (WEMC), Daniel Kull (WB), Roberta Boscolo (WMO)	
9:20-9:30 UTC	Introductions	Alberto Troccoli (WEMC)	Get acquainted with participants, present course outline and objectives
9:30-10:30 UTC	Weather & climate services for the energy sector Chair: Alexey Kobzev (DKU)	Laurent Dubus (RTE/WEMC), Alberto Troccoli (WEMC)	Explain what weather and climate services are. Demonstrate how these are valuable for the energy sector
10:30-11:00 UTC	Break & networking		
11:00-11:30 UTC	The energy sector in Central Asia: current status and emerging trends Chair: Alberto Troccoli (WEMC)	Iva Brkic (UNECE) & Sergey Tulinov (ESCAP)	
11:30-12:30 UTC	Panel: Weather and climate services for supporting energy transitions in Central Asia: local barriers and opportunities Chair: Barbara Janusz-Pawletta	Jane Ebinger (WB), Alexey Kobzev (DKU), Asset Nauryzbayev (Expert), Ainur Sospanova (Qazaq Green association)	Outline opportunities and challenges to the uptake of weather and climate services to support energy transitions in the region

Session 2 (23.02.22): What is needed for delivering weather and climate services

Time	Title	Speaker	Objective
9:00-10:00 UTC	Good practice in delivering weather and climate services development for the energy sector Chair: Alexey Kobzev (DKU)	Roberta Boscolo (WMO), Chiara Cagnazzo (C3S)	Explore best practice in weather and climate service development for the energy sector
10:00-11:00 UTC	Panel: National weather & climate	Alua Sakhanova (Kazhydromet),	Understand the state of national weather and

	services for the energy sector– the perspective of the National Hydrometeorological services in the region Chair: Anahit Hovespyan (WMO)	Elena Akentyeva (GeoPhysical Obs), Natalya Vasilenko (Kyrgyzhydromet), Anvarsho Dorgayev (Tajikhydromet), Kristian Horvath (Croatia Hydromet)	climate services provided to the energy sector and identify national capacities and needs
11:00-11:30 UTC	Break & networking		
11:30-12:30 UTC	Introducing practical: planning an energy weather/climate service for your country/company	Alberto Troccoli (WEMC)	Introduce the process of creating a mini-proposal for a weather/climate service

Session 3 (25.02.22): How to design a climate service

Time	Title	Speaker	Objective
9:00-10:00 UTC	Collaborative approaches to weather and climate services Chair: Iva Brkic (UNECE)	Clare Goodess (UEA)	Explore co-design principles, from understanding users' needs, co-production and co-delivery, also touching on evaluation
10:00-11:00 UTC	Group work - build your own mini climate service/ proposal Chair: Alberto Troccoli (WEMC)	Mentors: Iva Brkic (UNECE) Sergey Tulinov (ESCAP), Alexey Kobzev (DKU), Hamid Bastani (WMO)	
11:00-11:30 UTC	Break & networking		
11:30-12:30 UTC	Weather and climate forecasting for energy applications in the region Chair: Alberto Troccoli (WEMC)	Sue Ellen Haupt (NCAR), David Brayshaw (U of Reading)	Understand the science behind and application of weather and climate forecasting for the energy industry

Session 4 (28.02.22): Applying weather and climate services for the energy sector

Time	Title	Speaker	Objective
9:00-10:00 UTC	Presentation: Weather and climate sources data for the energy sector: Copernicus C3S, the Global Solar and Wind Atlas, etc Chair: Laurent Dubus (RTE/WEMC)	Matteo DeFelice (JRC) Jake Badger (DTU)	Explore sources of data for the development of weather and climate services
10:00-11:00 UTC	Case studies: applying climate services in the energy industry Chair: Matteo DeFelice (JRC)	Altyнай Zhabbasbayeva (Kazhydromet), Dana Yermolyonok (GIZ), Jose Alberto Zúñiga Mora (ICE)	Panel showcasing case studies using weather
11:00-11:30 UTC	Break & networking		
11:30-12:30 UTC	Group work – build your own mini climate service/ proposal	Mentors: Iva Brkic (UNECE) Sergey Tulinov (ESCAP), Alexey Kobzev (DKU),	

[Session 5 \(02.03.22\): Applying weather and climate services for the energy and related sectors](#)

Time	Title	Speaker	Objective
9:00-10:00 UTC	Insurance and hedging for energy and agriculture Chair: Daniel Kull (WB)	Lukas Sundermann (Swiss Re)	Learn how insurance is used to hedge hydropower production and agricultural products in the region
10:00-11:00 UTC	Panel: Weather and climate services for risk management and net-zero infrastructure development Chair: Daniel Kull (WB)	Alma Zhukonova (Ministry of Energy of the Republic of Kazakhstan), Yuri Simonov (Roshydromet) Vladislav Bizek (WECOOP), Laurent Dubus (RTE/WEMC)	Discuss what is required to support weather and climate services for the net-zero transition and low-carbon investment.
11:00-11:30 UTC	Break & networking		
11:30-12:30 UTC	Group work – build your	Mentors:	

	own mini climate service/ proposal	Sergey Tulinov (ESCAP), Alexey Kobzev (DKU), Iva Brkic (UNECE)	
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Session 6 (04.03.22): Concluding thoughts and participants' presentations

Time	Title	Speakers	Objective
9:00-10:00 UTC	Building regional and cross-sectoral capacity on weather and climate services – what is needed? Chair: Roberta Boscolo (WMO)	Andreas Schaffhauser (ZAMG)	Explore what individual, organisational and institutional capacities are needed to enhance collaboration and uptake of weather and climate services in the region
10:00-11:00 UTC	Elevator pitch of projects Chair: Roberta Boscolo (WMO)	Group representatives	Demonstrate the group work performed during the training event
11:00-11:30 UTC	Break & networking		
11:30-12:30 UTC	Closing and farewell	Alberto Troccoli (WEMC), Dr Barbara Janusz-Pawletta (DKU), Alexey Kobzev (DKU)	

Abbreviations:

C3S	Copernicus Climate Change Service
Croatia Hydromet	Croatia Hydrometeorological National Service
DKU	Kazakh-German University
DTU	Technical University of Denmark
ESCAP	Economic and Social Commission for Asia and the Pacific
GeoPhysical Obs	Geophysical Observatory
GIZ	German Society for International Cooperation
ICE	Instituto Costarricense de Electricidad
JRC	European Commission's Joint Research Centre
Kazhydromet	Kazakh Hydrometeorological National Service
Kyrgyzhydromet	Kyrgyz Hydrometeorological National Service
NCAR	National Center for Atmospheric Research
Roshydromet	Russian Hydrometeorological National Service
RTE	French Transmission System Operator
Swiss Re	Swiss Re Group
Tajikhydromet	Tajik Hydrometeorological National Service
U of Reading	University of Reading

UEA	University of East Anglia
UNECE	United Nations Economic Commission for Europe
WB	World bank
WECOOP	European Union – Central Asia Water, Environment and Climate Change, Cooperation
WEMC	World Energy & Meteorology Council
WMO	World Meteorological Organization
ZAMG	Central Institute for Meteorology and Geodynamics