LIVING LABS AND SUSTAINABILITY IN GERMANY AND CENTRAL ASIA

REPORT AND INSIGHTS ON A STUDY TOUR OF CENTRAL ASIAN PROFESSIONALS TO THE GERMAN LIVING LABS ON 12-20 JUNE 2023

ISoG BW
Intersectoral School of Governance Baden-Württemberg

SPCE HUB
Sustainability Partnerships across Central Eurasia and Europe

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Report and insights on a study tour of Central Asian professionals to the German living labs on 12-20 June 2023.

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INTRODUCTION

Central Asia and Europe are linked not only by decades of oil trade and increasing climate and sustainability cooperation. Both regions face multiple megatrends and challenges, such as climate change, global energy transition, and digitalization. These trends and challenges are interconnected and cannot be solved by one sector or a country in isolation. Rather they require coordination and cooperation within and across national borders and sectors[1]. Moreover, energy transition and progress in sustainability require innovations at many levels, including technology and entrepreneurship, but also social innovations, e.g. when it comes to energy saving.

"Living labs" can play an instrumental role in fostering this progress. They can enable learning from international best practices and innovations, adapting them to the local context as well as testing and developing own, 'home-grown' solutions. They can also help to improve stakeholder coordination and speed up the transition process. Living labs bring many benefits. They

- test new potential solutions supported by scientific evaluation before putting them into practice at large scale;
- help to identify challenges during the implementation phase;
- improve the "ownership" and acceptance of solutions by local stakeholders (see also Eckart et. al. in this report page 38)

> *"Living Labs are open innovation ecosystems in real-life environments using iterative feedback processes throughout a lifecycle approach of an innovation to create sustainable impact. […]Living labs operate as intermediaries/ orchestratorsamong citizens, research organisations, companies and government agencies/levels."*[2]

[1] The concept of Intersectoral Governance is explained on page 6

[2] Source: European Network of Living Labs, *https://enoll.org/about-us/what-are-living-labs/*

From 12 to 20th of June 2023, 11 outstanding renewable energy and sustainability experts from three Central Asian countries, Kazakhstan, Kyrgyzstan and Uzbekistan, visited Germany. The study trip aimed to create and deepen energy transition networks between Germany and Central Asia and to introduce Central Asian stakeholders to the concept of living labs and its implementation in Germany. In the course of this study tour the Central Asian delegation visited three living labs, two public and private institutions, spoke to members of the German Parliament and took part in the conference "Energy Transition, Sustainability, and Inclusive Development" at the Berlin Global Village. The trip was co-organized by the Intersectoral School of Governance BW (ISoG BW) and the research and impact facilitator SPCE Hub and financed by the German Academic Exchange Service (DAAD) with funds from the German Federal Foreign Office.

Members of the Delegation of Central Asian Renewable Energy and Sustainability Experts

This report was co-produced by participants of the study trip. It aims to shed light on the German and Central Asian projects and initiatives on energy transition and sustainability. The first part of this report presents the living labs, which were visited during the study-trip. They include 1) 'c.HANGE' living lab by ifeu institute Heidelberg on developing approaches and instruments of clean heating at municipal, national and European levels. 2) The Energy Lab Tuebingen at the University of Tuebingen, which showcased a successful multi-stakeholder collaboration between the city, academia and the private sector. 3) DELTA Project, a large living lab project at the Technical University of Darmstadt. The second part of the report features interviews with participants of the study trip and presents a pilot living lab on cycling in Bishkek, implemented by SPCE Hub.

We hope that this report would be of interest for students, researchers and policy makers working on energy transition, renewable energy, energy efficiency, waste management, and other relevant fields.

Testing and reflecting governance in times of global warming, energy transition and digitalisation

Author: Monika Gonser (Germany)

The concept 'Intersectoral Governance' draws its roots from the system theory developed by the sociologist Niklas Luhmann. According to Luhmann, societies are functionally differentiated, meaning that distinct functional systems, such as the economy, the legal system, or science, are established to address specific social tasks. Each of these systems operates based on its unique 'logic of action.' For instance, the economy ensures the provision of goods in response to demand, the legal system establishes clear rules, and science advances reliable knowledge.

Recognizing that many pressing issues transcend sector boundaries and that sectors are mutually dependent, effective societal guidance and coordination necessitate the involvement of the government, business, and civil society. The government defines the spaces within which non-state actors can also participate in a coordinated manner. In a city striving for energy sustainability, for example, various sectors collaborate to drive the energy transition and improve efficiency. The city government establishes an Energy Transition Office to lead efforts. Local businesses, including energy providers and technology companies, invest in renewable energy infrastructure and energy-efficient practices. Environmental organizations and community groups educate residents on energy conservation, organize energy audits, and advocate for renewable energy adoption. Last but not least, local universities conduct research on renewable energy technologies and social innovations. They also provide expertise in energy policy and implementation.

Intersectoral governance acknowledges the complex, interconnected nature of modern challenges and emphasizes the need for collaborative efforts across sectors. In a complex world, there is often not a singular solution but rather multiple viable and acceptable scenarios exist. Intersectoral cooperation does not seek a single definitive 'truth' but revolves around evaluating the acceptability and advantages of various solutions among stakeholders. Subsequently, it involves crafting a shared, and therefore, "true" solution that holds validity for all parties involved. To facilitate effective solutions in sectoral governance and cooperation, competencies such as systemic thinking, emotional intelligence, a moderating approach, and stakeholder engagement are essential.

RECOMMENDED READING

1. Hancock, David (2016): Tame, Messy and Wicked Risk Leadership. London: Routledge
2. Innes, Judith E.; Booher, David E. (2018): Planning with Complexity. An Introduction to Collaborative Rationality for Public Policy. New York: Routledge.

PART I:
LIVING LABS AND SUSTAINABILITY CHAMPIONS IN GERMANY

‚Kesselcheck' is an app for heating system owners that ifeu developed together with plumbers

ifeu Institute in Heidelberg: Living lab "c.HANGE" - Craftsmen as change agents

Reported by Kubatbek Muktarbek uulu (Kyrgyzstan)
and Agzamkhon Niyazkhodjayev (Uzbekistan)

The Institute for Energy and Environmental Research (ifeu) is a private, non-profit research institute in Heidelberg in South-West Germany. It was founded in the mid-1980s and nowadays employs more than 100 experts. The Institute works on a wide range of topics such as energy, heating, mobility, nutrition and biomass management.

In 2017-2019, ifeu implemented a living lab named 'c.HANGE'. This living lab attempted to figure out how to replace fossil fuels with renewable energy and waste heat in the district heating sector in order to meet zero-carbon neutrality in the building sector in Germany by 2050. One of the assumptions of the project was that change in the heating sector requires not only technical solutions and political regulation but also support and commitment of citizens, homeowners and technical sanitary (plumbing and heating) professionals. The inclusion of technical sanitary professionals seemed to be especially important, since there was evidence that the majority of single and multi-family homeowners follow the recommendations of these professionals when deciding on the type of heating system for their flats and houses.

The main goal of the living lab was to improve the quality of consulting by sanitary professionals to end customers that could help to increase energy efficiency and the share of renewable heat in residential buildings. To reach this goal, several activities

were implemented: 1) The project experts conducted online surveys and qualitative interviews to gather data on the purchasing and decision-making behaviour of homeowners. 2) Based on the results of the survey, the living lab team developed a mobile phone app called *Kessel-Check*' ('boiler check'). The app was designed to support sanitary professionals and end customers to properly assess their heating system. The launch of the app was accompanied by a comprehensive PR campaign. It also included a challenge between two neighbourhoods to activate citizens installing and using the Kessel-Check app. 3) Together with the sanitary professionals, the living lab team organised and implemented workshops to explore new services and business models 4) Based on the findings from the engagement with citizens and the sanitary professionals, the living lab experts drafted recommendations for policymakers concerning political and regulatory instruments to address barriers and promote heating systems, based on renewable energy sources. 5) The lab produced training materials and a start-up initiative to improve the quality of consulting and encourage the use of renewable energy technologies in the heating sector.

The project revealed major challenges of an energy transition in the heating sector. One of them was the complexity of implementing renewable heating systems, which will require continued research, development and innovations. Another major challenge was the financial burdens on homeowners associated with the installation of new heating systems.

Nevertheless, the project can claim a number of successful outcomes. One of them was the increased participation of homeowners in the *Kessel-Check*, indicating a higher interest in energy-efficient heating solutions and greater public awareness about the importance of clean heating. The living lab team also received positive feedback from homeowners and small businesses regarding the comprehensive and neutral approach of the *Kessel-Check*. Furthermore, the project generated follow-up orders for craft businesses, indicating a tangible economic impact. But the most important outcome in our view was that homeowners showed interest in exploring more energy efficiency and renewable energy options, which led to further energy consulting and heating system upgrades.

To realise the project, ifeu involved project partners from various disciplines, including the Institute for Management Technology at the German Institute of Skilled Crafts (ITB), the Business Informatics Project Group at the Fraunhofer Institute for Applied Business Informatics, and the Institute for Ecological Economy Research (IÖW). The institute also partnered with stakeholders from civil society as well as two city administrations (Heidelberg and Schriesheim). The project was implemented within two years with a budget of 150,000 euro.

https://www.ifeu.de/projekt/c-hange/
(in German)

Visit to Professor Volker Hochschild, University of Tübingen

Energy Living Lab Tübingen

Reported by Alexey Kobzev (Kazakhstan)
and Abylaikhan Soltanayev (Kazakhstan)

A successful energy transition requires not only funding and guidelines at the national level, but also technical knowledge, awareness and participation at the local level. The *Energielabor* Tübingen (Energy Lab Tuebingen) has dealt with these local issues of the energy transition. The main topics of this collaborative research project were renewable energy, energy efficiency and energy supply. The Energy Lab Tübingen addressed these key points in order to facilitate the transition to sustainable energy in the city of Tübingen.

This project was implemented from 2016 to 2019 jointly by the Geographical Institute (University of Tübingen), the Institute for Energy Economics and Energy Management (University of Stuttgart) and non-academic partners, such as the company Stadtwerke Tübingen, the association BUND, and others.

The objectives of Energy Lab Tübingen were to identify the potential of renewable energy sources and to disseminate information about the sustainable production and utilisation of renewable energy in Tübingen. A wide range of suggestions and ideas, developed by the project, showed how residents of Tübingen can contribute to shaping the city's clean energy transition. Ideas included research and testing of the potential of sustainable energy supply and renewable energy utilization, using methods from geoinformatics, engineering as well as human and social sciences.

In order to achieve the set objectives, various tasks were determined. One of them

was an assessment of the potential of renewable energy resources in selected urban neighbourhoods in Tübingen, which was presented to the residents in the form of city atlas maps. These maps were available on a special webportal during the lifetime of the project. However, after the closure of this project, the funding for hosting of the website was discontinued, resulting in the loss of important data to date.

Researchers investigated how different shares of renewable energy affect energy consumption, infrastructure, greenhouse gas emissions, the city economy and the socio-spatial structures in individual neighbourhoods in Tübingen. Furthermore, energy efficiency strategies were developed at the district level of the city, e.g., through energy balance flows. In addition, existing initiatives and stakeholders of energy transition in Tübingen were connected with scientists and citizens in order to jointly develop and implement steps for a clean energy transition.

Clean energy transition processes require awareness and appropriate skills on the part of participants, which can and should be transferred and practiced through education for sustainable development. Accordingly, over the years of the project implementation, various educational events for the citizens of the city and courses at the university have been organised.

Every year a course on 'Understanding, Shaping and Teaching Sustainable Development' is taking place. Students play a key role in the Energy Lab as part of the academic community as well as residents of the city, and can develop and take part in various initiatives within the project. This course helps to integrate ethical aspects of sustainable energy supply in educational programmes, thus encouraging student participation in this project.

In 2016, a scientific expedition on the topic 'Where does our electricity come from and why do we need it?' was organised for school children at the Explorer's Day at the Children's University of Tübingen to introduce the basic concepts of the clean energy transition and to foster a culture of sustainability in a game way.

The final event was an exhibition for the general public on the topic of *'Raus aus der Nische'* (From Niche to City). The citizens' exhibition was conceived as part of a student workshop. It presented various posters and stands depicting Tübingen residents and initiatives, devoted to climate protection in their daily lives, showing what works well, where they face obstacles, and what they would like to do in the future.

https://uni-tuebingen.de/en/research/centers-and-institutes/international-center-for-ethics-in-the-sciences-and-humanities/research/nature-and-sustainable-development/energy-laboratory-tuebingen/

Exchange in a workshop of the Delta Living Lab, University of Darmstadt

Living Lab DELTA Project, Technical University Darmstadt

Reported by Taalaibek Mederov (Kyrgyzstan) and Saida Yusupova (Uzbekistan)

Energy efficiency, energy conservation, and resource optimisation are equally crucial aspects of the energy transition, alongside the increasing use of renewable energy sources. In order to explore innovative approaches for energy preservation, existing urban infrastructure should be carefully examined. This involves assessing the current state of residential and industrial buildings, neighbourhoods, and the existing power and heating grids.

The Living Lab DELTA tries out and evaluates solutions for a green transition in energy-intensive cities on the example of the city of Darmstadt. The Lab has over 20 partners and is led by the University of Darmstadt. With a budget over 20 million euros, the project is set to last six years. The DELTA Lab has ambitious goals. The developed solutions should save 14,500 tonnes of CO2 per year and increase the potential for energy flexibility. Energy flexibility among individual producers and consumers is necessary to integrate volatile wind and solar energy into the electricity grids. Energy flexibility can be increased not only through demand side management but also with the help of innovative storage technology.

One sub-project of the lab focuses on creating an interactive, energy-optimised industrial district, undertaken in collaboration with the science and technology company Merck. Merck oversees heating processes on its campus, including a high-

pressure water supply at 150°C and processes ranging from 20°C to 90°C. The project aims to significantly reduce Merck's energy demand and enhance the utilisation of waste heat. In addition, surplus waste heat generated on Merck's campus should be redirected to the district heating supply in residential areas of the city of Darmstadt.

Another fascinating sub-project involves collaborating with tech start-ups and aims to facilitate technology scale-up. Start-ups usually come up with innovative tech concepts, but they often lack a chance to test these ideas in a real-world setting. The DELTA Living Lab provides them with a platform for testing and refining technologies developed in a real-life environment.

Among the technologies that are being tested in the Living Lab are thermal energy storage, an intelligent window handle designed to decrease natural gas consumption in older buildings by 20 percent, and an intelligent radiator thermostat intended for schools and larger halls, with the aim of reducing heating energy by 30 percent.

The transition to net-zero neighbourhoods and environmental protection can be further facilitated through social innovations that address resource consumption and efficiency. The concept of sharing goods produced in energy-intensive ways can help to reduce greenhouse gas emissions and electronic waste. To this aim the DELTA Living Lab has integrated a subproject focusing on 'conservation of resources through urban sharing models'.

As part of this initiative, a 'sharing hub' and two additional 'sharing points' have been established on the campus of the Technical University of Darmstadt and within the city of Darmstadt. These facilities are designed to promote and facilitate pre-arranged physical sharing through digital platforms. Additionally, they serve as mobility hubs, enabling car-sharing projects and fostering sustainable transportation options.

The DELTA Living Lab project implementation can be challenging. The high number of stakeholders and complex, inter-linked subprojects require comprehensive consultations and preparations. A highly efficient and flexible stakeholder management is also crucial. In Central Asian countries similar projects could be feasible, but they would require a strong political will on the government side. The private co-financing model from various partners might be a challenge for the countries too, as it is not developed in our countries yet.

https://www.energiewendebauen.de/en/project/delta-darmstadt_energy_laboratory_for_technologies_in_application

KEA-BW Agency supports municipalities in various ways, including heat planning and local heating network construction

State Agency for Climate Protection and Energy Baden-Wuerttemberg (KEA-BW)

Reported by Nadira Rakhimova (Uzbekistan), Ainura Sagyn (Kyrgyzstan), Alexey Kobzev (Kazakhstan)

The Climate Protection and Energy Agency (KEA) is a public institution owned by the German federal state of Baden-Württemberg and founded in 1994. It currently has 39 employees. 80 percent of its budget is financed by public funds. The reason for its foundation was the growing awareness that climate protection and energy transition do not only take place at the nation-state level. The local level plays a major role in implementation and in innovative bottom-up processes.

The agency's main goal is to work with municipal actors on climate protection, energy transition and energy efficiency. It does so by providing free expert advice and information to different target audiences through its specialised competence centres. For instance, the competence centre for municipal climate protection works with the mayors of municipalities, climate protection managers, members of local city councils and NGOs. The competence centre for energy management aims to find ways to reduce energy consumption without large investment and supports the introduction of energy consumption monitoring. It supports public companies such as hospitals and energy utilities as well as state agencies. Other competence centres support local authorities with greening of the heating sector, climate-friendly renovation of old buildings and sustainable mobility.

The agency also organizes competitions and awards. One of the outstanding programmes is the European Energy Award (EEA). It focuses on transition towards climate-neutral societies and economies on the local level. The Agency supports local governments to successfully participate in the EEA process. Since 2006, 152 cities and communities and 28 counties in Baden-Wuerttemberg participated in the EEA. 109 municipalities got certified, 18 out of these received the gold standard. Another competition is eco-auditors, where high school students of 8th grade can apply. Each year, 20-25 outstanding students are selected as eco-auditors and receive training on the climate crisis, energy transition and project planning. As a follow up of the training, students design and implement projects in their schools.

Networking of various actors on diverse topics is another important activity of the state agency. KEA coordinates e.g., 12 regional solar energy networks that provide information and resources on solar photovoltaic (PV) panels for municipalities, counties, enterprises, farmers and citizens. The agency also created and sustains a network of public officials that work as climate protection managers in local governments.

https://www.kea-bw.de/
(only in German)

Kubatbek Muktarbek uulu and Ainura Sagyn are discussing the energy transition in Germany

EnBW AG Karlsruhe

Reported by Bahtiyor Eshchanov (Uzbekistan)
and Ainur Sospanova (Kazakhstan)

The black coal-fired steam power plant (Rheinhafen-Dampfkraftwerk or RDK) illustrates Germany's changing debate about the right path into the post-fossil era. The plant is located on the eastern bank of the River Rhine in Karlsruhe, South-West Germany, approximately 10 km east of the French-German border. Water from the Rhine river is used for the cooling system of the plant. The plant is operated by 'Energie Baden-Würtemberg' (EnBW), the third largest electricity producer in Germany with 25,000 workers. The Rheinhafen-Dampfkraftwerk of EnBW in total has eight blocks and only the 900 MW[3] state-of-the-art coal firing block no. 8 (RDK 8) is functional as of the date. Block no. 7 with its 550 MW coal-fired turbine can also be operated if needed. All other blocks are decommissioned.

When RDK 8 was commissioned by EnBW in 2015, it was praised as the cleanest coal power plant in Europe with a 47,5 percent conversion rate. Nevertheless, environmental groups and citizens protested against the power plant, arguing that its efficiency and cleanliness was not worth the immense throughput of fossil energy and CO_2 emissions. For example, when RDK 8 is switched off, 30 tons of oil is needed just to start the turbines from zero. When operated under full capacity (900MW), block 8 consumes 260 tons of coal per hour.

At the end of 2016, the Paris Climate Agreement came into force. In 2019, young people in particular began demanding a robust and strategic climate policy from

political leaders. They were supported by leading climate scientists and had a demonstrable impact on political debates and awareness amongst the population. At the end of 2019, the federal government passed its first climate protection law, which stipulated a 55 percent reduction in greenhouse gases by 2030 (compared to 1990) and climate neutrality by 2045. In July 2020, after long negotiations between the federal government, the states and the utilities, the German parliament passed the 'Coal Phase-out Act'. According to the law, the last coal-fired power plants, including RDK 8, are to be taken off the grid in 2038. Recently EnBW announced that it would phase-out its coal plants earlier, in 2028.

During our visit in June 2023, the plant was in an idle-mode - available to be operational at a short notice. The reason why the power plant does not always produce electricity: The cost of producing electricity by modern hard coal-fired power plants significantly exceeds the cost by older, less clean lignite-fired power plants. Electricity producers therefore tend to use the latter rather than the former. For this reason, climate experts and environmentalists would prefer to see the RDK 8 plant in operation more often than is currently the case. Primary measures of the plant ensure an optimal combustion process. The process largely prevents the formation of nitrogen oxides (NO_x) and carbon monoxide (CO) and leads to good ash burnout. Carbon capturing technology was envisaged when the block was initially designed. Yet, after the decision on the early decommissioning of RDK 8, the carbon capturing system was not installed. According to EnBW, the block is hydrogen compatible and can be turned into a hydrogen powered block.

It was an impressive excursion for the Central Asian visitors, during which they learnt about the so-called massive economic burden of net-zero transition, due to which Germany has decided to close such a unique and innovative coal power plant. Throughout their 12 days journey, the team has also observed a handful of nuclear power plants which were terminated due to Germany's nuclear power phase-out policy which is implemented in parallel to the coal phase-out policy. One could conclude from the visit that going net-zero requires significant sacrifice from utility companies and public budget.

In total, the cost of building the power plant amounted to approximately €1.3 billion, where US$735.67 million was provided as a loan by the European Investment Bank. The EnBW power plant, which could technically serve for another century, is being closed only several years after its launch. One wants to hope that green hydrogen will offer a second-life to the plant, due to which 900 MW innovative Alstom turbine will be operated at full-capacity while discharging zero emission to the environment.

https://www.enbw.com/company/the-group/energy-production/new-buildings-and-major-projects/karlsruhe_rheindampfkraftwerk/

PART II:

SUSTAINABILITY CHAMPIONS IN CENTRAL ASIA

RENEWABLE ENERGY DEVELOPMENT IN KAZAKHSTAN

Interview with Ainur SOSPANOVA

Qazaq Green Association

Interviewer: Yana Zabanova

Kazakhstan was the first country in Central Asia to develop renewable energy sources (RES). Since then, more than ten years have passed. What achievements of Kazakhstan with regards to RES development over these years would you mark as particularly important?

I consider the main achievement that the adoption of the law "On Supporting the Use of Renewable Energy Sources" in 2009 laid the basis for the development of RES and defined all the basic rules of the sector. Back then there was no understanding of the economics of the model, nor of the impact on energy and the environment. Today we have a law on RES, contracts for the purchase of electricity, a scheme for the purchase and sale of electricity, a single purchaser, and most importantly, tariffs at which renewable electricity is purchased and which are indexed annually, which is very important for investors. In other words, there is a scheme that has been accepted by major financial institutions and believed in by investors.

In addition, by the end of 2020, we have achieved our target of a three percent share of RES in the country's total energy balance. We have shown investors that all processes in Kazakhstan are transparent and understandable, corruption risk and major investment risks have been reduced. The second point is that, with the successful implementation of renewable energy projects, more and more investors began to view Kazakhstan as an attractive destination for their utility-scale RES projects as well. Large companies such as Total, ACWA Power, Masdar, China Power would not have come to Kazakhstan if the market were immature.

Also, for me personally, as an expert, it seems important that oil companies have entered the RES sector in Kazakhstan. Back in 2013-2014 there was no interest in renewable energy. Today all major oil and gas companies in Kazakhstan, including NCOC, KazMunayGaz, Total, Eni, Chevron, are focused on implementing a low-carbon strategy. Some already have portfolios of successfully implemented projects - for example, Eni and Total, others are making plans for the future. That is a big step.

What challenges is Kazakhstan currently facing in the field of further development of RES and decarbonisation of the economy in general?

When the strategy for achieving carbon neutrality by 2060 was being developed, I was part of the working group as an expert. Of course, the very fact of having such a document is already a great achievement for Kazakhstan. But unfortunately, the adopted document adopted does not contain indicators. In my opinion, we need to refine the strategy, as well as sectoral programmes and look at ways of decarbonising processes in each of the country's economic sectors.

One of the effective mechanisms is a reduction of direct combustion of hydrocarbons in industry and electrification of the processes where possible. Plus, of course, the technologies that are being developed now - CCUS, which use hydrogen as an alternative fuel - are important. But I would say that the economics of green hydrogen production in the Kazakhstani realities is still unclear. I mean in particular a question of water availability for electrolysis.

In the coming decades, Kazakhstan will undergo tectonic shifts in the power sector, whether we want it or not. Not only the technology will change, but also the market. . The balancing electricity market, which was launched in Kazakhstan on 1 July 2023, will have an impact on the power infrastructure upgrade, especially with regard to integrating growing shares of renewable power generation. Yes, consumer tariffs will inevitably rise, but it is impossible to keep tariffs in check all the time without modernising the existing infrastructure. If Kazakhstan's energy system is to develop and adapt to the new challenges, there is no way around raising the consumer tariffs.

You are the person who stood at the origins of RES development in the country. In your opinion, what factors can help to increase support for energy transition both by the general public and specialists working in the energy sector? Can you give examples from your own experience?

I have been working in the RES sector since 2009. In my opinion, the attitude towards renewable energy and energy transition over the last 14 years has significantly improved in the country. Previously decision-makers did not understand the importance of renewable energy sources and sometimes even opposed their development. Today there are a lot of public associations in favour of a green future. Students and schoolchildren are already well aware of climate change and are promoting these ideas in their families. It is clear that we are still talking about big cities. But I think that people in rural areas, where renewable energy facilities are being developed. see concrete benefits for themselves. Therefore, public consciousness is gradually changing, and this process will only intensify - maybe not as fast as in Europe, but nevertheless.

The Yryskeldi Qazhy Mosque in Kazakhtan's capital Astana is almost energy self-sufficient

The second point is, of course, the reorientation of expertise. I think a number of people obtaining hydrocarbon-related professions will reduce as more and more people will choose sustainable "green" professions. There are already positive developments. In particular, a technological university is being opened in Aktau together with Germany. The Oil University in Atyrau, which traditionally trained oilmen, now offers Master's programs in sustainable development. Universities that were previously engaged in purely electric power engineering, such as Almaty University of Power Engineering and Communications, Eurasian National University, and Agrarian University, are now training personnel

in renewable energy specialty. So, there is a gradual reorientation towards green professions. It is also important that both small and medium-sized businesses and households have access to knowledge on the use of renewable energy for their needs. Such courses are emerging in the country. Our association has recently opened the Qazaq Green RES school. We have already conducted the first courses and we see interest in the topic.

It is also important to remember that in Kazakhstan, trends are set from above. Our president really supports the green agenda, which is why the attitude of akims, ministers and other decision makers is gradually changing. The renewable energy support system is being improved, and our Qazaq association has a great merit in this endeavor.

You recently took part in the study trip to German on Living Labs for the Energy Transition. In your opinion, what is the potential of using this approach to accelerate energy transition in Kazakhstan and the Central Asian region as a whole?

It is a very effective measure to demonstrate Germany's comprehensive approach to energy transition. I have the impression that the whole country is preparing for the energy transition, starting with the representatives of working professions - electricians, plumbers - and ending with employees of federal ministries. Everyone understands that the energy transition is inevitable and must be taken into account in all aspects of their work.

In our case, however, we need to train people in the working professions to use appropriate technologies to adapt to climate change. Their range of services should also include water- and energy-saving technologies for example. If our technicians start to change their thinking, we will also see changes at the level of households, individual businesses and municipalities. This is what we have been shown at Living Labs in Germany. I think it is very important to find a common language not only with specialists, but also with ordinary people who are interested in spending less on tariffs. We need to talk to them in a language they understand, to explain that it is more favourable to use more expensive green technologies today, because they will save money and resources in the future. I believe that the multi-stage and systematic approach that was presented to us in Living Labs is the key.

https://qazaqgreen.kz/

TEACHING CLEAN ENERGY TRANSITION

Interview with Dr Abylaikhan SOLTANAYEV
Senior Lecturer at Almaty University of Power Engineering and Telecommunications, Kazakhstan

Interviewer: Aijan Sharshenova

Dr Soltanayev, your institution is quite unique in the region as it hosts interdisciplinary and international innovative projects and training programmes. But before we talk about your work, could you please tell us what brought you personally into the area of sustainable energy?

My first encounter with sustainability took place during my course on Electrical Energy Studies in 2010 at the Almaty University of Power Engineering and Telecommunications (AUPET). That year I managed to bring together a group of undergraduate students and convinced the university management to open an additional specialty for us in the area of Sustainable Energy. After continuous negotiations with the Almaty University this group graduated with degree in Electrical Supply Studies and graduation projects in the area of renewable energy sources. Since then, the Almaty University could graduate green energy professionals with a specialty in Renewable Energy Sources. In addition, I participated in the International Association for the Exchange of Students for Technical Experience (IASTE) funded by DAAD and travelled to Technical University Darmstadt in 2011. In Darmstadt, I got practical experience in working with solar photovoltaic panels and other renewables. After that, I received a Master's degree in Renewable Energy and Energy Systems Management at the City University of London. Upon my return to Kazakhstan, I have worked in various renewable energy projects in the private sector, including design and construction of renewable energy stations and in the higher education sector, developing a special course on Renewable Energy Technologies.

The Kazakh-German University and the Almaty University of Power Engineering and Telecommunications have collaborated with international donors to design and conduct a unique Clean Energy Transition course for Bachelor and Master students. Where did this idea come from? Is there a demand for such courses?

I would like to start with the Renewable Energy Trip, an education project, which gives an opportunity to visit many renewable energy infrastructure facilities in Kazakhstan. The Kazakh-German University and Dr. Alexey Kobzev in particular organizes this annual trip. During one of these trips, I met Alexey and we discussed various topics and opportunities for green energy cooperation. One of them was the Clean Energy Transition course, developed with the support of the US Embassy in Kazakhstan. The team, who designed the innovative Clean Energy Transition course, included myself (as a representative of the AUPET), the Kazakh-German University, as well as experts in ecology, sustainable development, urban planning and public policy from various higher education institutions, including the Kazakh-British Technical University, Satpaev University, and the US-based universities - the George Washington University and George Mason University.

The Kazakh-German University hosted a five-day training, where the course designers and invited speakers discussed the course topics to do a test run. The course got positive feedback from the training participants. I became the first partner to introduce this course into the Master's programme "Modern and Innovative Renewable Energy Technologies" at the AUPET. It is planned that the course will be delivered by Israeli scholar Trofimov German Gennadievich, who has directly participated in Kazakhstan's energy transition.

Recently, we held a meeting with the representatives of the Southern Kazakhstan region, where we managed to showcase our course. They warmly welcomed it and informed us that even though they could not fully introduce the course into their curriculum, they would use a part of the course, which is a good outcome. There are also plans to scale the course up and extend it to the neighbouring Central Asian countries.

As an educator, you are in constant touch with youth at work: Do you feel that this generation is more environmentally conscious?

Unfortunately, the level of environmentally-friendly mindset in Kazakhstan is rather low, in my opinion. At present, I work at the main training hub for energy professionals in Kazakhstan, and I closely work with students from all regions of the country. I can clearly see a gap between the mainstream energy students and those, who specifically chose the renewable energy education. The former simply have no understanding of ecology because, as they testify themselves, they have not been taught anything environment-related at school or at home. The latter have basic knowledge and understanding of the importance of environmental issues. The big issue is that the mainstream energy students are several hundred, while the renewable energy students are hardly a couple of dozen.

Yereymentau Wind power plant in Noth-Central Kazakhstan

What are the key challenges to ensuring a smooth and efficient transition to clean energy in Central Asia in general and in Kazakhstan in particular?

The main challenge in Kazakhstan is the passive public attitude. People are afraid that the clean energy production would lead to an increase in energy tariffs. Also, there is major lack of understanding of environmental protection and ecology. At the same time, the increasing number of accidents at large power stations demonstrate that the energy transition cannot wait. While the broken boilers in the Kentau town during the heating season went unnoticed, the frozen city of Ekibastuz case drew the attention of the entire country. Nevertheless, the Kazakh public has

not learnt any lesson from this. People still seem to be ready to suffer through the burnt coal smell at heating stations rather than pay for cleaner energy. There is no understanding that they will have to pay way more to address their health issues caused by the environmental pollution.

Kyrgyzstan largely relies on its hydropower stations. However, when water levels are low, the country experiences an energy deficit. So, the country also needs more renewable energy sources to meet its energy security needs. However, this does require significant investment and a solid regulatory framework to ensure financial guarantees to future clean energy investors. The big question is who will pay for the clean energy expenses. In addition, in Kyrgyzstan energy prices are very low, which makes privately-run renewable energy projects unprofitable.

Uzbekistan relies on hydropower and gas-turbine power stations. However, water remains a limited resource, and low water levels might affect both agriculture and energy production. A similar pattern applies to gas: This resource will simply exhaust itself in the near future. Therefore, Uzbekistan urgently needs a large number of solar power stations. In addition, it also needs to develop a solid regulatory foundation to introduce renewable energy sources through increasing the number of investors.

In your opinion, what Kazakhstan needs to do to speed up its transition to clean energy?

Kazakhstan needs to increase public awareness about environmental issues and ensure a full and broad understanding that, for example, the increasing number of chronic diseases among Almaty children is linked to the pollution caused by heating stations and hundreds of old cars. For example, we could learn best practices from Germany: They built cleaning and filter infrastructures at heating plants such as Rheinhafen-Dampfkraftwerk to mitigate the damage to people's health and environment. We could increase the number of environmental organisations and authorise them to visit harmful industrial projects, as well as to increase pollution fines. Companies should feel that a clean transition makes more sense than paying miniscule fines.

What do you think of the potential of living labs in your country?

Living Labs could possibly give an impetus to sustainable development in Kazakhstan, if all stakeholders are fully committed. These stakeholders are government (city and municipal authorities), quasi-governmental organisations (SICs - social-industrial corporations), academia (universities, colleges, schools), businesses, environmental protection organisations, and of course the wider public. As I said earlier, the population should get some basic knowledge on these issues. They also need to understand that these initiatives are not short-term, but sustainable and long-term. There is an urgent need to realise that if these projects are supported by all people to the best of their ability, there will be improvements.

The living labs concept can fulfil its potential in Kazakhstan if labs are widely publicised for all to see, rather than being implemented in narrow circles for reporting and ticking boxes. There was a case of a living lab, which operated at a university in Astana, but all its participants were from one university, which goes against the very essence of the living labs concept.

https://aues.edu.kz/en
https://dku.kz/

TAZAR RECYCLING INITIATIVES

Interview with Ainura SAGYN

Co-founder of Tazar, a Waste Management Platform in Kyrgyzstan

Interviewer: Aijan Sharshenova

Dear Ainura, you have created an unprecedented waste management platform having connected the buyers of recyclables and the consumers, who can sell these recyclables. Where did this idea come from? Why did you decide to address the waste management issue four years ago?

Kyrgyzstan and its neighbours Tajikistan, Uzbekistan and Kazakhstan are beautiful countries with mountains, streams, and bountiful natural resources. However, over the past 20 years, our beautiful nature is tainted with the growing waste, which threatens our environment as well as the health of our citizens. All recyclable materials are being thrown to regular trash and sent to landfills. There are small local companies that are trying to reduce this problem through small for-profit recycling-processing plants. These companies collect recyclable material and process them at their facilities into recycled goods. We connect those companies with people.

In addition to the waste processing capacities of the site, Tazar includes an educational component. Our app is used to share knowledge about eco-conscious products and recycling companies across Central Asia to inspire and show users that recycling is feasible in Central Asia even in the absence of an efficient recycling waste management infrastructure provided by governments. Currently our work is designed to ensure a sustainable and direct impact on the recycling sector in Kyrgyzstan and encouraging eco-friendly behaviour. In a few years, we're aiming to scale it up to Uzbekistan.

Tazar platform connects a broad variety of stakeholders, from general public to private companies and state agencies. How do you manage to convince relevant state and private sector stakeholders?

Currently, Kyrgyzstan lacks the infrastructure to deal with this problem efficiently. I believe that small-scale projects carried out by passionate people can help solve this kind of problem in developing countries. The problem of the catastrophic spread of waste in Kyrgyzstan is growing every year due to two reasons. Firstly, citizens do not have any convenient way to deliver the recyclables to recycling centres in order to reduce waste. Secondly, the 'environmental awareness' has not yet gained popularity in Central Asia as a mainstream behavioural trend. According to the latest survey on waste management, 70 percent of Kyrzgyzstani garbage can be recycled, but only 14 percent of it is being recycled at the moment.

There are 500 recycling points, where people can drop off their recyclables. Tazar offers a detailed map of waste collection points, which can be accessed via Tazar mobile apps. You can download it for Apple and Android phones. Our social media platforms got more than 9000 followers, and the app got over 8500 downloads. Tazar has already become a positive force for social change in Bishkek. This is not just a functional service for reducing the amount of garbage, but also an effective public awareness tool with informative and engaging articles, research and tips.

Tazar gained a truly global fame when you were included to the BBC's list of 100 inspiring and influential women from around the world for 2022. Did this visibility bring additional support domestically and worldwide? Is there anything you would like to say to our readers?

After the BBC recognition, we got over 1000 pick-up orders, and more than 40 organisations expressed their wish to work with us. Such awards do help promote Tazar and generally raise awareness about what we, as individuals, can do in our local communities to help the planet. Annually over 400K tons of waste are thrown to landfill sites of Kyrgyzstan where potential recyclable materials, as well as hazardous waste are not utilised properly. This damages our environment, pollutes our water and soil,

and ends up in our bodies through food and water too. Thanks to our unique app, any person with a phone can find a recycling station and bring their recyclables, saving them from ending up at a landfill. We also offer a pick-up service for those, who might be unable to travel to recycling stations. Citizens can put an order, indicate how much recyclables they have, and indicate time for pick up.

Waste Management Workshop by Tazar at the EU simmer festival in Bishkek

What challenges does Kyrgyzstan face in tackling climate change?

The challenges of the climate crisis are urgent and overwhelmingly large. We can see that technologies are deployed around the globe across all sectors, with increasing integration to address the cross-sectoral sustainability needs. These technologies are the 'how' in addressing the climate crisis. The question 'who' is critically important in building a sustainable future and we are increasingly dedicated to ensuring equity in the sustainable future we are building. For centuries, technological advancements have fueled economic growth. These historical advancements have been costly. Kyrgyzstan faces the consequences of the Soviet rapid industrialisation, as well as struggles with the current global environmental challenges with limited financial resources to tackle both. However, we have a vibrant civil society and people, who care and are committed to make a difference in their lifetime. Thanks to these heroes we still have hope that we can reverse or mitigate the impact of climate change.

You are a true sustainability champion in Central Asia, who continues working with domestic and regional civil society actors and private sector entities. What is your message to your peers and their partners around the world?

We have difficult work ahead of us, but we can address the climate crisis. We must do this by investing our time and efforts into building collaboration across sectors and in our communities to ensure that everyone in this world has equal outcomes in our sustainable future.

Climate solutions will not come solely from the West. Developing countries can also lead this transformation. One of the challenges is to address the growing climate crisis without limiting economic opportunities for people. We need to reconcile our country's development with its climate response, which is greater and more urgent than ever. Developing countries such as in Central Asia cannot follow the same development path that Western economies have taken over the last century and a half. We know the dire consequences of rapid industrialisation for the global climate and environment, so we must find a different way to improve living standards.

Therefore, it is fair that advanced economies provide additional technological and financial assistance to the developing world. This is the price of our shared responsibility for the planet. The answer lies in planning intelligently and reducing wasteful damage, so that our lands can serve as both a natural brake on climate change and a foundation for sustainable development. Tazar is a pioneer in providing integrated environmentally friendly services and solutions, strongly committed to protecting the environment by improving the communities in which we work and live. Tazar is equipped with a team of professionals who have a proven expertise in developing sustainable and cost-effective solutions for environmentally concerned clients. Our recycling initiatives are custom designed for various sectors from corporate organisations, educational institutions and residential apartments to the community at large.

There is an urgent need to transform our relationship with the environment. Governments and companies will need to think deeper about how they interact with the people, places, and things required to make their products if they want to be serious about their impact.

What do you think of the potential of living labs in your country?

Living labs in Kyrgyzstan would be a very efficient and sustainable way to address local issues. It can be difficult for the state to address local issues due to its limited financial capabilities. Local stakeholders might be missing funding and expertise too. However, if we can bring together an agile, invested and close-knit network of partners, who can chip in their expert knowledge, political will, human resources and financial resources, it would be an amazing way to fix a variety of existing problems.

http://www.tazar.org/en/

GREEN BUSINESS INNOVATION AND TECH4IMPACT

Interview with Saida YUSUPOVA

co-founder and CEO of Green Business Innovation and Tech4Impact, Uzbekistan

Interviewer: Aijan Sharshenova

What brought you into the area of sustainability? Was it a deliberate transition or a stroke of luck?

My first encounter with sustainable development came about through my work at the UNDP's environment and energy unit back in 2008. I have realised the importance of sustainability approach at the macro, micro and individual levels. I was lucky to get a scholarship to pursue a Master's degree at St. Andrews University in UK in 2013. This gave me confidence to start my own consultancy business "Green Business Innovation" and open an NGO "Tech4Impact" together with my partners.

What are key activities of Green Business Innovation in Uzbekistan?

Green Business Innovation's mission is to accelerate Uzbekistan's move to green growth and sustainable economy. The company's activities include consultancy services in climate change, green technologies and energy efficiency. We work on renewable energy projects and clean tech accelerations programs in Uzbekistan and Central Asia.

The mission of Tech4impact is to promote female entrepreneurship in green tech and young women in the Science Technology Engineering Mathematics (STEM) sector.

There is a lack of women in STEM in Uzbekistan and in the world in general. Does being a woman make your work easier or harder in your chosen business area?

Yes, indeed, there is a lack of women in STEM in the world and in Uzbekistan. That is why we initiated Tech4Impact in Uzbekistan in order to contribute to closing this gap. In many projects by Green Business Innovation women are unfortunately underrepresented. Interestingly, when working with international partners, I do not feel the difference in gender, so the work is concentrated on professional topics. Unfortunately, in the work with local partners I can observe that men are interested in how a woman can work in the tech sector, in the energy sector for example. The stereotypes sit very deep in our local mindset. This will change with time, once we have a bigger percentage of women in tech sectors including decision making/executive level.

Tech4Impact with Unisat participants visited the Nur Navoi 100 MW Solar Plant

Having worked in the area of sustainability both in international development and in private business, do you feel that the public perception and attitudes to climate change and sustainability are changing? Are people in Uzbekistan more interested in the topic?

Definitely the perception of climate change and sustainability is changing at an accelerating pace. The risks and challenges of climate change have become the concern of each individual. In European countries I can observe that people think and act in terms of reducing their carbon footprint. In Uzbekistan this topic has been increasingly discussed

in the last five years. Over the last two years sand storms, hotter summers, droughts and water scarcity have been giving people a sense of responsibility for the impact on nature. However, in Uzbekistan people expect that the Government should do something and sort out the problems. Partially I agree that the Government should take actions on legal bases and develop low carbon strategies, however it's important that the third sector: businesses, NGOs and individuals take an active position in changing the mindset and cooperate in reaching sustainable livelihood.

If you could talk to younger self, what would you tell yourself and other aspiring early career professionals in Uzbekistan?

The world is turbulent, and everything is changing fast, pursue your dreams and act now!

https://gbi-consult.com/
https://www.tech4impact.uz

PILOT LIVING LAB ON CYCLING INFRASTRUCTURE IN BISHKEK

Members of the Living Lab discuss the experiment on site

Authors: Jochen Eckart,
Kubatbek Muktarbek uulu, Sebastian Schiek

At the beginning of 2022, several representatives from Kyrgyzstani and German organisations initiated a pilot Living Lab on sustainable mobility in Bishkek. The project was coordinated by SPCE Hub and the Friedrich Ebert Foundation. Members of the Lab were Prof. Kubatbek Muktarbek uulu, traffic engineer at the Technical University of Bishkek, Prof. Cholpon Turdalieva, mobility sociologist at the American University of Central Asia (AUCA), as well Rada Valentyna kyzy and Altynai Nogoibaeva, cycling and public engagement experts at the urban intiative Peshcom. From the German side, project partners were Prof. Jochen Eckart, traffic ecologist at the Karlsruhe University of Applied Sciences, and Prof. Monika Gonser, sociologist and expert for multi-stakeholder approaches at the Intersectoral School of Governance (ISoG BW) in Heilbronn.

	Goals and activities of the Pilot Living Lab
Intended impact	Contributing to sustainable urban development and transport in Bishkek through promotion of cycling
Bishkek assets	The city of Bishkek already developed a concept for a network of bike routes and first bike paths are already laid down. The city administration plans to expand the cycling network and university experts already work on the topic. There is a thriving cycling community and cycling NGOs.
Intended Outcomes	1) Recommendations for the city on how to expand the cycling network quicker and in a more efficient way through safe and convenient pop-up cycling lanes (on the roadway) instead of separated bike paths; 2) Higher level of public awareness on the advantages of cycling for liveable cities and public health.
Activities	During the project duration 1) Two workshops in Bishkek in April and August 2022; 2) Street inspection and meetings with experts from the city administration in October 2022; 3) Conference with the head of the international office of Bishkek City Hall and the German Ambassador in October 2022; 4) One-month research stay in Karlsruhe, financed by German Academic Exchange Service. The pop-up cycling lanes were implemented on Toktogul street in the centre of Bishkek by the city hall in cooperation with the NGO PeshComBishkek in September 2023.

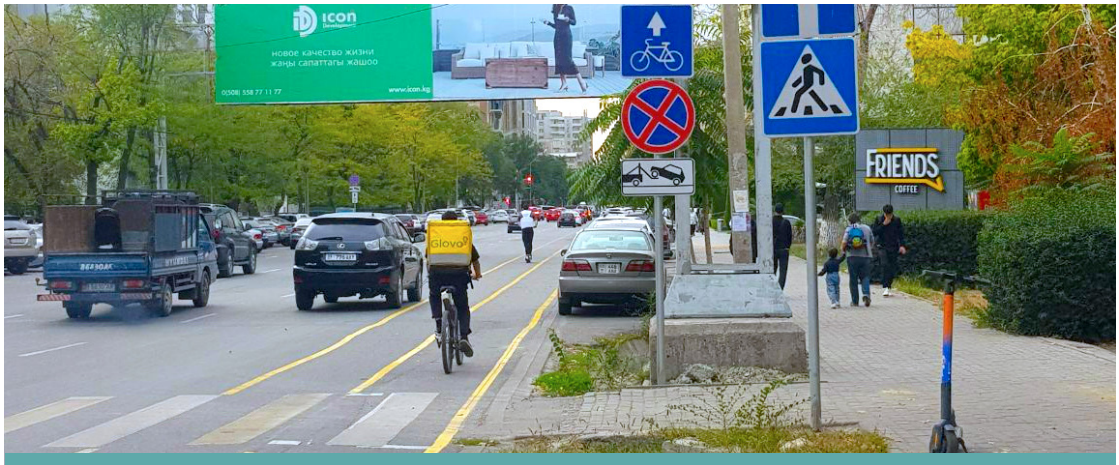
During the first workshop in April 2022, hosted by the OSCE Academy in Bishkek, the Lab stakeholders discussed the opportunities and challenges of traffic and mobility in Bishkek. Prof. Eckart introduced the idea of living labs for sustainable, active mobility and presented his own projects on the promotion of active mobility in Karlsruhe (Germany), Nairobi (Kenia) and Kampala (Uganda).

According to Eckart, Living Labs facilitate temporary testing of new potential solutions, supported by scientific evaluation, before putting them into practice at large scale. This can help to identify challenges such as unforeseen problems during the implementation phase or the lack of acceptance by users, citizens or business. Living Labs improve the "ownership" of solutions by local stakeholders and also help to overcome obstacles for implementation of innovative solutions, speeding up transition processes. After the discussion and the presentation on living labs, all lab members were invited to suggest ideas and potential solutions to improve sustainable mobility in Bishkek. Amongst the suggestions were the improvements of bus stops and the installation of traffic lights for cyclists. At the end of the presentations, the Kyrgyzstani experts voted for an experiment with pop-up cycling lanes. The goal of this experiment was to temporarily install and test pop-up cycling lanes on a suitable road in Bishkek. Such lanes are quicker and cheaper to install and are more convenient and safer.

During the second workshop in October 2022, traffic planners and engineers from the city administration as well as representatives of the city hall and the traffic police joined the discussion. The workshop, chaired by Prof. Muktarbekov, aimed to introduce the Living Lab concept to the new participants, but also to discuss and plan the experiment - the construction of the pop-up cycling lanes. An important milestone of the project was the approval of the project by the mayor's office.

During the third workshop in September 2022, the members of the Lab and experts from the city administration visited a section of road that could be considered for the implementation of the living lab. Based on the visit, the experts developed three options that could be potentially tested. These proposals were discussed with representatives of the city administration, the traffic police and other experts.

In September 2023, the city administration implemented the pop-up cycling lanes on the Toktogul street (Center Bishkek) in cooperation with the urban initiative Peshcom.



Pop-up cycling lanes on Toktogul Street, Bishkek

https://peshcom.org/
https://www.h-ka.de/en/ivi/
https://kstu.kg/

Credits

Report Editors

Aijan Sharshenova, *Crossroads Central Asia*

Komila Nabiyeva, *freelance journalist and author*

Sebastian Schiek, *Co-Founder SPCE Hub*

Report Contributors

Abylaikhan Soltanayev, *Almaty University of Power Engineering and Telecommunications, Kazakhstan*

Agzamkhon Niyazkhodjayev, *Institute for Eastern European Studies, Freie Universität Berlin, Germany*

Ainur Sospanova, *Qazaq Green Association, Kazakhstan*

Ainura Sagynova, *Tazar, Kyrgyzstan*

Alexey Kobzev, *Kazakh-German University (DKU), Kazakhstan*

Bahtiyor Eshchanov, *Fiscal institute under the tax committee, Uzbekistan*

Kubatbek Muktarbek uulu, *Kyrgyz State Technical University, Kyrgyzstan*

Nadira Rakhimova, *Green Business Innovation, Uzbekistan*

Saida Yusupova, *Green Business Innovation, Uzbekistan*

Taalaibek Mederov, *Kyrgyz State Technical University, Kyrgyzstan*

Yana Zabanova, *Research Institute for Sustainability, Potsdam, Germany*

Jochen Eckart, *Hochschule Karlsruhe - University of Applies Sciences, Karlsruhe, Germany*

Monika Gonser, *Intersectoral School of Governance BW (IsoG BW) Duale Hochschule, Baden-Württemberg (DHBW), Heilbronn, Germany*

Support

Sara Ruggeri, *Event Manager, Intersectoral School of Governance BW (IsoG BW) Duale Hochschule, Baden-Württemberg (DHBW), Heilbronn, Germany*

Design & Art Direction

Altynai Nogoibaeva, *altynai.ngbv@gmail.com*

ISoGBW
Intersectoral School
of Governance
Baden-Württemberg

The Intersectoral School of Governance Baden-Württemberg (ISoG BW) is part of the School of Advanced Studies at DHBW in Heilbronn, Germany. It is headed by Monika Gonser, Professor for Intersectoral Studies. ISoG BW conducts research on intersectoral climate governance and enables professionals and executive staff members from business, government and civil society to learn intersectoral skills.

Intersectoral School of Governance BW
Bildungscampus 13, 74076 Heilbronn, Germany

https://www.isog.dhbw.de/en/
isog@cas.dhbw.de

SPCE ⋄ HUB

SPCE Hub is a dynamic think-and-do hub that brings together scientists and practitioners in collaborative efforts to co-design and implement living labs, promoting mutual learning in all directions. SPCE Hub's focus encompasses energy transition and sustainable development.

SPCE Hub
IPGT Berlin, Rollbergstr. 28A, 12053 Berlin, Germany

https://www.spce-hub.org
info@spce-hub.org

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