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**Renewable Energy and Energy
Efficiency in Central Asia:
Prospects for German Engagement**

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About the Publisher

The Michael Succow Foundation was established in 1999 as the first charitable conservation foundation under the Civil Code in the new federal states of Germany. The prize money from the Right Livelihood Award, bestowed upon Prof. Dr. Michael Succow in 1997, was donated as the basis capital for the foundation, which aims to 'Preserve and Sustain' the ecological balance.

The Michael Succow Foundation is an operational foundation on the national and international level. It is engaged in the development and protection of national parks and biosphere reserves in the transformational countries of the former Eastern bloc (Azerbaijan, Turkmenistan, Uzbekistan, Russia).

For almost 10 years, the recognition and conservation of Germany's national natural heritage has been the foundation's most important emphasis nationally. Accordingly, the foundation is currently managing 13 Nature Conservation Areas in north-eastern Germany, with other areas soon to follow. The goal is the development of wilderness oases, accompanied by special opportunities to visit and experience nature firsthand, which are meant to foster a deeper understanding for the re-transformation of the Central European cultural landscapes into wilderness.

Professor Michael Succow and his deeply committed team are supported by an honorary foundation board and countless active volunteers. The foundation works in close co-operation with the Institute of Botany and Landscape Ecology of the Ernst-Moritz-Arndt University in Greifswald, as well as with many other national and international research facilities, i.e., the International Institute for Deserts, Flora and Fauna in Ashgabat, Turkmenistan.

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Abstract

Central Asia has enormous potential for the deployment of renewable energies. Yet, comprehensive policies and financial mechanisms that would encourage private investments in this sector are lacking. With the growing interest in renewable energy and especially energy efficiency across Central Asia, Germany could foster developments in the region by sharing its Energiewende (energy transition) know-how and best practices. This paper reviews the prospects and current trends of the renewable energy and energy efficiency sector in Central Asia and makes recommendations for the areas, where Germany could intensify its support to the Central Asian countries in their transition to green economies. The paper is based on a literature review and structured interviews with experts both from Germany and Central Asia.

Keywords: Central Asia, Germany, renewable energy, energy efficiency, Energiewende

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Abbreviations & Acronyms

AA	German Federal Foreign Office (Auswärtiges Amt)
ADB	Asian Development Bank
BMUB	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
BMWi	German Federal Ministry for Economic Affairs and Energy
BMZ	German Federal Ministry for Economic Cooperation and Development
CAREC	Regional Environmental Centre for Central Asia
CASEP	EU-funded Programme “Sustainable Energy Programme for Central Asia: Renewable Energy Sources and Energy Efficiency”
Dena	German Energy Agency (Deutsche Energie Agentur)
EBRD	European Bank for Reconstruction and Development
EU	European Union
EE	Energy efficiency
FES	Friedrich Ebert Foundation
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GTAI	Germany Trade and Invest
GW	Gigawatt
IEA	International Energy Agency
INOGATE	EU-funded energy co-operation programme for countries in Eastern Europe, Caucasus and Central Asia
IFC	International Finance Corporation
KfW	German Development Bank (Kreditanstalt für Wiederaufbau)
KyrSEFF	Kyrgyz Sustainable Energy Financing Facility, EBRD credit line for energy efficiency projects in Kyrgyzstan
MW	Megawatt
NAMA	Nationally Appropriate Mitigation Actions
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
RE	Renewable energy
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

Executive Summary

Central Asia has a high potential for renewable energy (RE) power generation and solar water heating. Wind power in Kazakhstan, solar energy in Uzbekistan, the energy of small rivers in Kyrgyzstan, solar and hydro energy in Tajikistan and solar energy in Turkmenistan have especially high prospects. Yet, public awareness of RE benefits remains low and institutional mechanisms which would foster investments in the sector are lacking.

As an Energiewende pioneer Germany could foster the Central Asian energy transition by sharing its know-how. As interest in RE and especially energy efficiency (EE) across Central Asia is growing, Germany has the chance to strengthen its position as a key partner in the region. This paper shows that the latest trends in energy sector in Central Asia are promising. With relevant support of German government and businesses, the countries of the region could better realize their vast RE and EE potentials and accelerate their currently slow pace of transition to green economies. This paper builds a case for an intensified German engagement in Central Asia and gives recommendations on priority cooperation areas.

Current trends in the RE and EE sector across Central Asia

A number of positive developments on sustainable energy can be observed in the region:

- **All Central Asian countries with the exception of Turkmenistan have adopted primary legislation on RE/EE and formally introduced a number of incentives**, e.g. grid-access, tax exemptions and feed-in tariffs which, nevertheless, need to be negotiated for each project.
- **Kazakhstan is by far leading in the region.** The country has adopted a national plan on transition to a green economy, made voluntary pledges on reduction of its greenhouse gas emissions and introduced a pilot emissions trading system. In 2017,

Kazakhstan is hosting the World Expo on “Future Energy” which should give an additional boost to RE/EE projects.

- **Uzbekistan is constructing the first on-grid photovoltaic power park** in the region with Asian Development Bank (ADB) loans. Tajikistan and Kyrgyzstan are implementing several projects on small hydropower, supported by the ADB and Russia and on energy efficiency, financed by the European Bank for Reconstruction and Development (EBRD) and the World Bank.
- **Although RE is still seen in Central Asia as a prerogative of economically rich countries, the region demonstrates well-developed and increasingly growing interest in EE measures.** Kazakhstan, Uzbekistan and Turkmenistan see it as way of increasing their fossil-fuel exports, whereas Tajikistan and Kyrgyzstan hope to reduce their dependence on energy imports from the neighbouring countries.

Despite excellent RE growth potential, the actual deployment in the region remains very low. Currently, the share of RE in electricity generation varies from less than one per cent in Kazakhstan and Turkmenistan to up to three per cent in Uzbekistan and Tajikistan. A number of barriers hinder investments in RE across Central Asia. High fossil fuel subsidies and low electricity prices significantly reduce the competitiveness of RE. Due to limited access to affordable bank loans, potential investors cannot afford the relatively high initial investment costs. The number of local technology providers and technical specialists on sustainable energy as well as feasibility studies and economic analyses on RE in the region are lacking. Public awareness and media coverage of RE/EE benefits is low.

Recommendations for German engagement with Central Asian countries on RE and EE

- **As a first step, a substantial increase in targeted information about the German Energiewende in Russian language is needed.** The German Energiewende has a huge potential to serve as a show-case in Central Asia. In the region, Germany is widely perceived as a leader in quality

technology and its successes in transition to RE are admired, even if little of motivation behind it is understood. Yet, currently available information about the Energiewende in Russian is very limited. The existing scarce materials are mere translations from German. A brief review of the media in Central Asia (in Russian) indicates little understanding and a lot of misconceptions of the latest developments in the RE sector in Germany. More political and social dialogue on RE/EE, thematic conferences and field trips to Germany for key players from Central Asia could foster public discussion of the RE benefits and challenges and raise public awareness in the region. Also, the German government, political foundations and other actors should consider intensifying support to local programmes, fostering awareness among NGOs and journalists.

- **Germany should intensify its RE/EE know-how transfer.** For that the German government could increase the number of projects supporting consultations with the Central Asian governments on legal frameworks and financial incentives which encourage investments in RE/EE. Germany could channel investments into joint enterprises in Central Asia, co-organize more RE/EE industrial fairs in the region and intensify German-Central Asian business to business meetings. The focus should be made on simple and affordable technology. Germany should also extend educational cooperation with the region by introducing dual degree and vocational programmes, supporting university exchanges and research cooperation as well as the development of curricula on RE/EE. Germany could also provide consultancy support on the development of RE feasibility studies.
- **Germany should extend its development cooperation with Central Asia to RE/EE.** Currently, German development cooperation with the region does not focus on energy. In economically less affluent Kyrgyzstan and Tajikistan the deteriorating energy infrastructure and insufficient energy access in rural areas makes a strong case for

decentralized, off-grid RE power generation. Germany could extend its support to RE and EE projects in these two countries.

- **Germany should increase its financial cooperation with Central Asia.** High fossil fuel subsidies significantly reduce competitiveness of RE in the region. Therefore, it is crucial to introduce financial de-risking mechanisms, e.g. zero or low-interest loans and loan guarantees from development banks. Germany could play a key role in enabling affordable loans from KfW or international development banks and supporting Central Asian countries in the development and introduction of micro-loan schemes (with low or zero interest rates) for farmers, families and small and medium enterprises, similar to the EBRD's Sustainable Energy Facility in Kyrgyzstan.
- **Germany should consider a new Framework Central Asia Strategy.** The EU Central Asia Strategy 2007-2013 promoted by Germany during its 2006 EU presidency was not renewed and the EU has since been gradually downscaling its political engagement in the region. Germany has no specific strategy for Central Asia either. A new strategy on Central Asia could send a clear signal that the region is still seen as an important partner in the EU and Germany. The strategy should focus on priority areas such as RE/EE, in which the EU/Germany enjoy significant credibility and can really make a difference. The German Federal Ministry for Economic Cooperation and Development is currently updating its 2005 Central Asia strategy. This is a unique chance to include cooperation on RE/EE as one of the focuses of the new strategy.

1. Introduction

As Germany held its EU Presidency in 2007, Central Asia¹ came under the international spotlight. Shortly after the first Russian-Ukrainian gas dispute which led to energy cut-offs in Europe in early 2006, Germany promoted the EU Strategy for Central Asia 2007-2013². One of its objectives was to secure access to rich natural gas resources of Turkmenistan for European markets. Yet, despite considerable diplomacy efforts, the agreement on gas supply from Turkmenistan was not reached and the EU has ultimately failed to deliver on its own energy security goals (Melvin, 2012).

Meanwhile, the energy industry in the EU and especially in Germany has been undergoing significant changes. With its ambitious Energiewende (energy transition) plan Germany is rapidly accelerating power generation from renewable energy. In the last decade it increased sixfold and provides a quarter of Germany's electricity. By 2050 the share of renewable energy should reach 80 per cent. The crucial question is whether this experience can be partly reproduced elsewhere and how Germany can foster energy transitions in other parts of the world by sharing its know-how and refining its financial and technical cooperation.

With some 300 days of sunshine per year and vast wind and hydropower potential, the prospects for energy production from renewable sources in Central Asia are very high. Yet, most countries in the region lack comprehensive legal and regulatory frameworks and technical know-how. That is where Germany, one of the key partners

of the region, could make a significant contribution.

This paper reviews the prospects, challenges and the latest trends in the renewable energy³ and energy efficiency sector across Central Asia and examines the role that Germany could play in supporting the Central Asian countries on their way to a low-carbon economy. The research draws on a literature review and structured interviews with German and Central Asian experts on renewable energy and energy efficiency. Interview partners included representatives of German federal ministries, businesses and consultancies, working with or in Central Asia as well as international and Central Asian organizations with energy expertise in the region.

2. Renewable Energy and Energy Efficiency in Central Asia

2.1. Major trends on renewable energy and energy efficiency across Central Asia

Distribution of energy sources in Central Asia is scattered. The downstream Kazakhstan, Uzbekistan and Turkmenistan are rich in fossil fuel (coal, gas and oil) whereas hydropower resources are concentrated in the mountainous upstream Tajikistan and Kyrgyzstan. During the Soviet era the upstream countries provided water to downstream countries in exchange for energy. After the collapse of the Soviet Union the water-energy balance in the region was destroyed (Eschment, 2011). Already scarce water resources became a subject of tensions, as they are vital for agricultural production in the arid downstream

¹ For the purposes of this work, the five former Soviet countries of Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan are referred to as Central Asia. For more information on the history of the definition see Stadelbauer, 2007.

² For more information on the EU Strategy for Central Asia see: www.auswaertiges-amt.de/cae/servlet/contentblob/473818/publicationFile/5063/EU-CentralAsia-Strategy.pdf

³ In this paper the term "renewable energy" is used as a reference to solar, wind, small hydropower and biomass energy.

countries and for power generation in the upstream countries.

Numerous studies by international organizations give evidence of the enormous potential for power generation from sun, wind, biogas and small hydro in Central Asian countries (GIZ, 2009; UNESCO, 2010; UNDP, 2014a/b). Wind power in Kazakhstan, solar and biogas energy in Uzbekistan, the energy of small rivers in Kyrgyzstan and Tajikistan and solar power in Tajikistan and Turkmenistan have the highest prospects for electricity generation (cf. UNDP, 2014a). Solar water heating and decentralized off-grid power generation from renewable energy sources makes especially strong case in the distant rural areas of the region with limited access to the grid and conventional energy sources.

However, despite the excellent growth potential, the actual deployment of renewable energy sources across Central Asia remains very low. Currently, the share of renewable energy⁴ in electricity generation varies from less than one per cent in Kazakhstan and Turkmenistan to about three per cent in Uzbekistan and Tajikistan (See Table 1).

A number of barriers hinder investments in renewable energy in the region. High fossil fuel subsidies and low electricity prices significantly reduce competitiveness of renewable energy in Central Asia. In 2012, Uzbekistan (61 per cent⁵), Turkmenistan (49 per cent) and Kazakhstan (29 per cent) had the highest energy subsidy rates in Europe and the CIS (IEA, 2013).

Potential investors in renewable energy in the region have limited access to affordable bank loans and as a result, often cannot afford high initial investment costs (UNDP, 2014b). In most Central Asian countries with the exception of Kazakhstan legally binding targets on renewable

energy are lacking which increases the risk of return of investment (UNDP, 2014b). Another significant barrier is the lack of know-how and a limited number of local technology providers and specialists in the renewable energy sector. Reliable feasibility studies and economic analyses on perspectives of renewable energy in Central Asian countries are either limited or lacking.

Experts highlight that the public awareness and understanding of benefits of renewable energy in Central Asia is low. The potential of renewable energy in the context of the water-energy conflict between the upstream and downstream countries is hardly being discussed. Public discussions on a magnitude of renewable energy benefits and trends, including their rapid growth worldwide, falling prices on renewable energy technology as well as the prospects for employment and the prevention of brain drain across the region, are not common. Public awareness on financial prospects for the countries within the scope of the Kyoto Protocol mechanisms⁶ and NAMA facility⁷ is very limited.

⁴ Large hydropower is not included.

⁵ Average fossil fuel consumption subsidy rate was calculated as a proportion of the full cost of supply. In Russia, energy subsidy rate was 19 per cent and Ukraine 26 per cent (IEA, 2013).

⁶ For more information on Clean Development Mechanism and Joint Implementation, see:

http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php and http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php

⁷ For more information on NAMA facility, see: <http://www.nama-facility.org/news.html>

Table 1: Renewable energy in Central Asian electricity generation: technical potential and installed capacity.
Source: Author's compilation based on the UNDP renewable energy snapshots, 2014.

	Kazakhstan	Uzbekistan	Kyrgyzstan	Tajikistan	Turkmenistan
RE share in electricity generation, 2012	0.6%	3.2%	1.1%	2.5%	0,2%
Solar PV installed capacity, MW	<1	<1	0	<1	0
Solar PV technical potential, MW	3,760,000	593,000	267,000	195,000	655,000
Wind installed capacity, MW	2	< 1	0	0	0
Wind technical capacity, MW	354,000	1,600	1,500	2,000	10,000
Small hydro installed capacity, MW	115	394	41.4	132	5
Small hydro technical capacity, MW	4,800	1,800	1,800	23,000	1,300
Biomass installed capacity, MW	0	1.5	0	0	0
Biomass technical potential, MW	300	800	200	300	Not significant

On the positive side, all Central Asian countries with the exception of Turkmenistan have adopted primary legislation on renewable energy as well as formally introduced a number of incentives such as grid-access, tax exemptions and feed-in tariffs which, nevertheless, need to be negotiated for each project (UNDP, 2014b).

Across Central Asia, politicians and businesses are increasingly interested and willing to invest in energy efficiency. Due to outdated infrastructure dating back to Soviet times a large share of energy output is lost in transmission and distribution. In most of Central Asia primary energy intensity is more than double EU-27 levels (UNDP, 2014b) and electricity losses in Tajikistan and Kyrgyzstan reach 20 per cent of energy output (World Bank, 2014). Kazakhstan, Uzbekistan and Turkmenistan see in energy efficiency measures a cost-efficient way of increasing their fossil-fuel exports, whereas Tajikistan and Kyrgyzstan hope to reduce their dependence on energy imports from the neighbouring countries.

2.2. Country profiles on renewable energy and energy efficiency in Central Asia

Kazakhstan

The ninth largest country in the world, Kazakhstan has ample supplies of oil, coal, natural gas and uranium. It is the world's largest uranium producer providing 38 per cent of global supply (World Nuclear Association, 2014) and has the third largest crude oil reserves outside of the OPEC member countries (GEF/UNDP, 2011). Kazakh oil exports account for a quarter of the country's GDP (World Bank, 2011). For Germany the country is by far the most important trading partner in Central Asia (AA, 2014a). The EU is Kazakhstan's largest investor and the first trade partner accounting for 50 per cent of its foreign trade (EU Delegation in Kazakhstan, 2014).

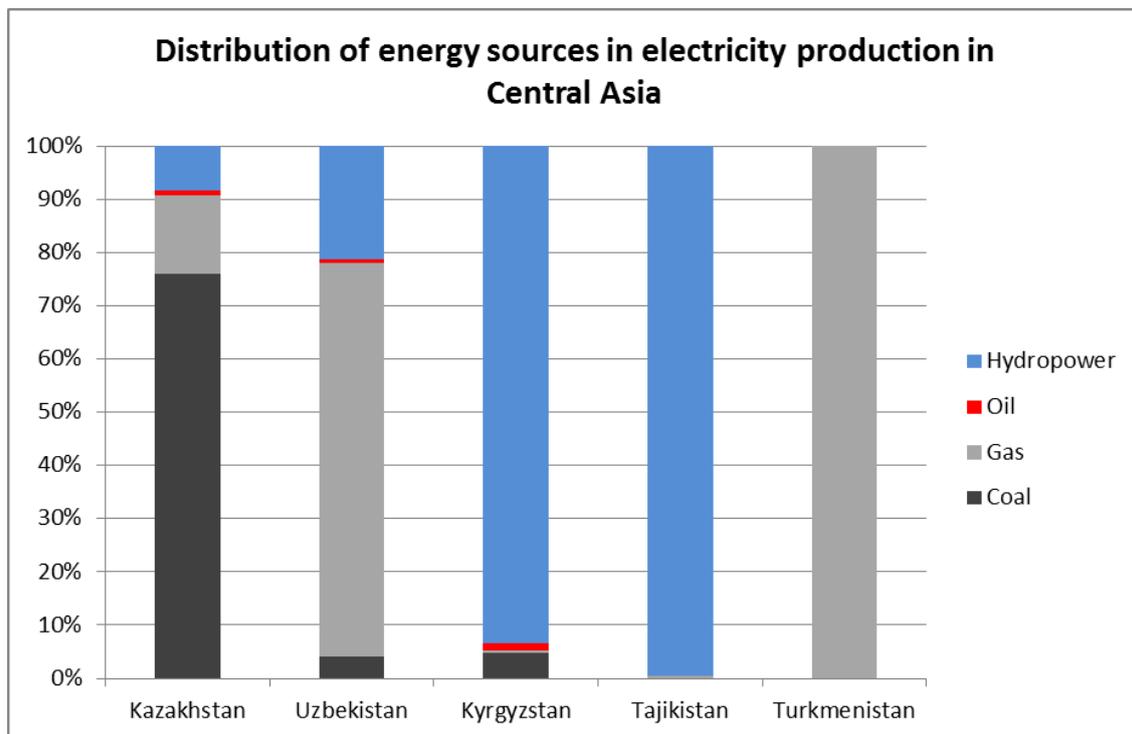


Figure 1: Source: Author's compilation based on data from IEA, 2012.

Currently, about 80 per cent of electricity in Kazakhstan is generated by coal (see Figure 1). As a result of energy-intensive mining and production industry, the country's emissions have climbed 40 per cent since 2006 (Germanwatch, 2013). The country is one of the world's biggest emitters per unit of GDP (EDF, 2014). To improve this trend, in 2010 Kazakhstan has voluntarily pledged to reduce its greenhouse gas emissions to 15 per cent below 1992 by 2020 (UNFCCC, 2010).

Kazakhstan has enormous potential for power generation from renewable sources. According to UNDP estimates, the potential of wind energy alone exceeds over ten times the required power generating capacity for Kazakhstan by 2030 (UNDP/GEF, 2012). Yet, the share of renewable energy in electricity production currently accounts for 0.6%, of which 95% is small hydropower (UNDP, 2014a). As Kazakhstan is sparsely populated, decentralized power generation could be particularly beneficial in distant villages of the country with little access to conventional energy sources.

With regard to the legislation, investment climate and technical capacity for renewable energy and energy efficiency, Kazakhstan is by far ahead of other Central Asian countries. "Green economy" has been a buzzphrase ever since President Nursultan Nazarbayev unveiled his 2050 Strategy in 2012. According to it, by 2050 Kazakhstan should enter the top 30 world economies (Akorda, 2012).

In 2013, the President adopted the Concept of transition to a green economy, according to which electricity generation from "renewable and alternative sources" in Kazakhstan will increase to 50 per cent by 2050 (Green Bridge, 2013). Nuclear power is part of the green mix and the country plans to have its first nuclear power plant built by Russia (Nabiyeva, 2014b).

In 2013, Kazakhstan adopted a law on supporting the use of renewable energy, according to which transmission companies are required to purchase the energy from renewable energy producers (UNDP, 2014a). In 2014, the Kazakh government set up renewable energy feed-in tariffs which will be secured for 15 years and adjusted annually to the inflation rate (AHK Zentralasien, 2014). In

2014 Kazakhstan planned to introduce the first national emission trading system in Asia. Yet, due to business opposition its pilot version was prolonged until 2015 (Nabiyeva, 2014a).

In 2017, Kazakhstan will host the World Expo Exhibition “Future Energy”⁸ which is expected to boost investments in renewable energy. The country is currently building the first wind park in Ereymentau, some 150 km from the Kazakh capital of Astana. The wind park with an installed capacity of 45 MW is due to be finished by December 2014 and to generate electricity for the Expo. By 2020, Kazakhstan wants to increase the share of renewables in electricity production to three per cent (1040 MW) and have 13 new wind, 14 hydropower and four solar power plants constructed (inform.kz, 2013).

Uzbekistan

Uzbekistan is the most populous country in Central Asia with its 30 million people making up nearly half of the region’s total population. The country is the largest energy consumer in the region (IEA, 2014) and potentially the biggest market for renewable energy. More than half of Uzbekistan’s population lives in rural areas, where electricity shortages and cut-offs are frequent due to illegal energy tapping and the poor state of the energy infrastructure (UNDP, 2014a). The country’s economy remains one of the most energy-intensive in the world (ADB, 2013).

Due to substantial gas and oil reserves Uzbekistan is energy independent (GIZ, 2009). Yet, a steady rise in domestic consumption suggests that the country could face gas supply shortages after 2020. The Uzbek government is interested in improving energy efficiency within the country to increase its gas exports (IEA, 2014). It also seeks to improve the investment climate, but significant problems such as the issue of currency conversion, bureaucracy and lack of legal certainty remain (AA, 2014b).

In March 2013, President Islam Karimov has adopted a decree on alternative sources of energy with a focus on solar energy (GTAI, 2014a). Currently, renewable energy producers in Uzbekistan are exempt from profit tax, property tax, and unified tax payments for small and medium enterprises (UNDP, 2014a). Uzbekistan lacks a national green economy strategy, but a law on renewable energy is currently under development. According to the UNDP in Uzbekistan, the Uzbek Government has commissioned the UNDP and the World Bank to develop the country’s “Vision 2030” which could give an additional impulse for renewable energy (Interview with UNDP Uzbekistan, 2014).

In 2012, the Uzbek government and the ADB signed a memorandum on solar power cooperation which includes feasibility studies for six solar power plants with a total installed capacity of 2 GW (GTAI, 2014a) and the establishment of the International Solar Energy Institute in the country to provide expertise for solar energy education, training and technology (ADB, 2012). In 2013, the ADB provided a USD 110 million loan to the Uzbek government for the construction of the first on-grid photovoltaic power park with 100 MW installed capacity in the Samarkand province (ADB, 2013).

UNDP Uzbekistan together with the Uzbek government is implementing a number of projects on introducing low-emission development strategies⁹ and promoting energy efficiency in public buildings in several regions of the country¹⁰. Together with the GEF small grants programme, UNDP also promotes the use of biogas for the production of electricity and heat in rural areas.

Kyrgyzstan

In Kyrgyzstan, almost 90 per cent of the territory is dominated by mountains. More than 60 per cent of the Kyrgyz population lives in piedmont or mountainous areas which makes their

⁸ For more information see: www.expo2017astana.com/en/

⁹ For more information see: <http://bit.ly/1pR9JIT>

¹⁰ For more information see: <http://bit.ly/UUvb0l>

provision with conventional energy sources difficult and expensive. Therefore, power generation from decentralized renewable energy sources is especially advantageous for distant rural households, crop and livestock farms, tourist resorts, pump stations and forest husbandries (UNESCO, 2010).

The potential of renewable energy in Kyrgyzstan remains mainly untapped. If large hydropower plants were defined as renewable energy sources, the share of installed renewable energy electricity capacity would reach 80 per cent (UNDP, 2014a). Meanwhile, the share of renewable energy (entirely small hydropower) in electricity generation in the country is only 1.1 per cent. At the same time three per cent of the small hydropower potential is being realized (Ibid). The biggest projects in the energy sector are implemented with Russian support, including the construction of four small hydropower plants on the river Naryn and the hydropower plant Kambar-Ata1 (UNDP, 2014a).

The 2009 law on renewable energy sources created a legislative framework for renewable energy feed-in-tariffs but is still to be fully implemented. Several bylaws including the definition of tariff calculation and determination are still under development. According to the law, imported equipment for the use of renewable electricity is exempt from customs duties (UNDP, 2014a).

The potential for energy saving in Kyrgyzstan is very high. Current losses in the energy distribution system are in the range of 40-50 per cent of energy output (GIZ, 2009). In 2012, Kyrgyzstan adopted a comprehensive set of primary and secondary legislation on “Energy Performance of Buildings” which introduced mandatory energy efficiency requirements, energy performance certification of buildings and regular inspection of heating systems (EBRD, 2012). One of the largest programmes aimed at improving energy efficiency in households and businesses

facilities is co-financed by the EBRD and the European Union¹¹.

Tajikistan

Decentralized renewable energy makes a strong case also in Tajikistan. Mountains cover 93 per cent of the country’s territory. Three quarters of the Tajik population living in distant villages accounts merely for 8-11 per cent of the country’s electricity consumption. The capital Dushanbe and the aluminium industry consume most of the power (UNDP, 2011). Electricity shortages and the absence of affordable conventional energy supplies force many rural households to heat by burning wood, shrubs and cotton stems (UNDP, 2011). As a result, the country has lost some 172,000 hectares of its forest cover since 1990 (GIZ, 2010).

Tajikistan is in the list of the world’s top 10 countries with the highest hydropower potential (OECD/IEA, 2010). Yet, only about five per cent of its total small hydropower potential is currently being used (UNDP, 2014a). Nearly every village in Tajikistan is close to at least one water flow. Since 2011, several privately owned mini and small hydropower plants started operating (Ibid). Yet, most of these plants are made out of spare parts and are quite inefficient (UNDP, 2011). Solar and biogas energy has also high prospects for power generation in the rural areas of the country.

Tajikistan still depends on natural gas imports from Uzbekistan and oil imports from Russia, Turkmenistan and Kazakhstan. The most significant obstacle for the development and export of hydropower generated electricity is the lack of available funding (GIZ, 2009). Instead of developing small hydropower, the Tajik government is focused on its controversial large hydropower Rogun project on the Vakhsh River

¹¹ For more details see Chapter 3.

which is a source of tension with the downstream Uzbekistan¹².

State owned electricity company Bargi Tajik owns most electricity generation capacity. The Tajik government has adopted a plan to restructure it until 2018 and to create an independent regulator in the electricity sector. Energy sector liberalization together with the reform of the tariff system could increase private investment in the future (UNDP, 2014a).

The main two renewable energy policies are the long-term programme for building small hydropower plants 2009-2020 and the 2010 law on the use of renewable energy sources. According to them, some 190 small hydropower plants with a total capacity of 100 MW are planned. This plan gives renewable energy producers more investment security and incentives (UNDP, 2014a). The Tajik government promotes renewable energy with project-specific feed-in tariffs guaranteed for 15 years. Independent small hydropower plants are exempt from a number of taxes, including the water royalty tax, customs duties, VAT on imported materials and equipment, exemption from profit, land and capital facility taxes (UNDP, 2014a).

Turkmenistan

Turkmenistan has the biggest gas reserves in Central Asia. It is energy self-sufficient and currently ranks in the top six countries for its natural gas reserves and in the top 20 in terms of gas production (World Energy Council, 2013). Since gas is subsidized by the state, electricity tariffs are very low.

Four fifths of Turkmenistan's territory consists of the Karakum desert, therefore the technical potential for solar and wind power is very high. According to Germany Trade and Invest, short- and mid-term prospects for solar power to get access to central transmission networks are low. Yet, power generation from renewable sources is

very attractive for distant areas and villages in Turkmenistan with low or no access to central heating and electricity (GTAI, 2014b).

Despite its high potential, Turkmenistan does not generate power from renewable energy. A specific legislative framework on renewable energy is lacking and the government shows no interest in developing the sector. A few experimentation centres in the country use solar energy for food drying and water desalination (GIZ, 2009). The only significant actor on renewable energy in the country is the Turkmen Solar Scientific Research Institute «Gün» under the Academy of Sciences which had implemented two projects on solar power with UN funding (GTAI, 2014b).

Since 1993 Turkmen citizens receive a quota of gas, electricity and water for free, whereas the consumed amount over quota should be paid. Therefore, energy efficiency is not on the top of the agenda for the Turkmen population. Electricity prices for public and private sectors are also very low and are not based on commercial calculations. The only incentive for energy saving is the possibility for the state monopolist Turkmengaz to extend its gas exports. With this in mind first measures for energy savings were undertaken, including the installation of electricity meters and a 10-time increase of the gas price in early 2014 (GTAI, 2014b).

¹² For more information about Rogun, see: <http://www.eurasianet.org/node/68761>

3. International Cooperation with Central Asia on Renewable Energy and Energy Efficiency

3.1. Major players and programmes on renewable energy and energy efficiency in Central Asia

This chapter presents a number of selected international and German projects on renewable energy and energy efficiency across Central Asia and gives a snapshot of upcoming developments and cooperation models that could be built upon or extended further.

Major donors supporting renewable energy and energy efficiency projects in Central Asia include the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the Eurasian Development Bank (EDB), the International Finance Corporation (IFC), the World Bank and the Global Environment Facility (GEF). The country offices of the UNDP and the Gesellschaft für Internationale Zusammenarbeit (GIZ), the Regional Environmental Centre for Central Asia (CAREC) and local non-governmental organizations often act as implementing agencies on the ground.

EBRD's Sustainable Energy Financing Facility

In 2013, the EBRD has launched a USD 20 million credit line for projects supporting energy efficiency improvements in households and businesses in Kyrgyzstan, the Kyrgyz Sustainable Energy Financing Facility (KyrSEFF, 2014). As part of the programme the EU Central Asia Investment Facility provides free technical assistance to project applicants as well as grants to businesses and private borrowers (between 20 and 35 per cent of the loan amount) upon successful

project completion (EBRD, 2013). By June 2014, under the KyrSEFF credit line a total of 337 loans for residential buildings and 28 business loans were disbursed (KyrSEFF, 2014) with majority of projects in the economically more affluent northern Chui oblast and Bishkek city.

Loans up to USD one million under the KyrSEFF are provided by local Kyrgyz banks (EBRD, 2013) with annual interest rate of up to 18 per cent. Private households can receive loans for the installation of energy efficient windows, the insulation of walls, roofs and floors and the installation of efficient boilers, heaters, solar water systems or heat pumps. In the commercial sector KyrSEFF supports the purchase of new production machinery, improvements in production processes and facilities. EBRD is considering launching similar loan schemes in Kazakhstan and Tajikistan.

EU-funded Sustainable Energy Programme for Central Asia

“Sustainable Energy Programme for Central Asia: Renewable Energy Sources and Energy Efficiency” (CASEP) is the only EU-funded project on renewable energy and energy efficiency in Central Asia (Moulin, 2013). The Programme is part of the larger INOGATE Programme on regional energy cooperation between the EU and 11 countries in Eastern Europe, Caucasus and Central Asia¹³.

The three-year programme (2013-2016) with a total budget of USD four million is being implemented by GIZ together with GFA Consulting Group and CAREC. The programme aims to support the Central Asian governments in developing relevant policies for renewable energy deployment and improvement of energy efficiency by sharing European know-how (CASEP, 2014). Local partners include ministries of environment as well as ministries of energy and industry in each respective country. In 2014, CASEP organized several consultations with

¹³ For more information see: <http://inogate-tag.org/inogate/home.php?lang=en>

government representatives in each country as well as the EU Sustainable Energy Week in Kyrgyzstan (Moulin, 2014).

3.2. German cooperation with Central Asia on renewable energy and energy efficiency

German bilateral development cooperation partners in Central Asia are Uzbekistan, Tajikistan and Kyrgyzstan. Due to their average income levels, Kazakhstan and Turkmenistan are not part of bilateral German development cooperation and are considered only in regional initiatives. The Federal Ministry for Economic Cooperation and Development (BMZ) is currently updating its 2005 Central Asia strategy but it is not clear when the new version will be ready and what thematic areas it will focus on (Email interview with BMZ).

Currently, BMZ focuses on economic development and health issues in Central Asia and does not support any project on renewable energy or energy efficiency in the region (Email interview with BMZ). The only project to be supported by the German development bank KfW in the region is a five million € grant for the rehabilitation of a small hydro power plant in Tajikistan (KfW, 2014). GIZ has supported a number of projects indirectly dealing with energy issues, incl. the one on transboundary water management in Central Asia¹⁴ and vocational training in the construction sector.¹⁵

Overall, German cooperation on renewable energy and energy efficiency with Central Asia is rather limited in comparison to other regions.¹⁶ Until the end of 2013, most of the German funding on support of climate and energy programmes in Central Asia was coming from the Federal Ministry for the Environment, Nature

Conservation, Building and Nuclear Safety (BMUB). Yet, since 2014 the energy issues were overtaken by the Federal Ministry for Economic Affairs and Energy (BMWi) which just started engaging the region, largely Kazakhstan, in its renewable energy and energy efficiency cooperation programmes.

BMUB NAMA project

“Integrated Approach for the Development of Low Carbon Development Strategies in Central Asia” was a two-year project (2011-2013) funded by the BMUB’s International Climate Initiative¹⁷ and implemented by the German DIW econ consultancy. The project aimed to support the Central Asian governments in their climate change mitigation efforts and transition to a low carbon economy. In cooperation with the respective governments the project helped to develop a Strategy for Green Growth for Kazakhstan and the Nationally Appropriate Mitigation Action (NAMA) proposals for Uzbekistan, Tajikistan and Kyrgyzstan.

The project activities included training courses and workshops, business-to-business meetings and the launch of a web-based information platform on renewable energy and energy efficiency in the region in Russian language¹⁸. In Tajikistan the NAMA project was focused on carbon sequestration through afforestation and reforestation, in Kyrgyzstan on the modernization of coal-fired small boiler houses, and in Uzbekistan on the modernization of residential buildings in Tashkent.

BMWi and dena cooperation

The Federal Ministry for Economic Affairs and Energy (BMWi) funds two major programmes promoting German technology and know-how abroad: “Renewables Made in Germany” and the “Energy Efficiency Export Initiative”. Within their framework, in 2013 an analysis of

¹⁴ <https://www.giz.de/en/worldwide/15176.html>

¹⁵ <https://www.giz.de/en/worldwide/14078.html>

¹⁶ In other regions BMZ supports extensive regional programmes on renewable energy/energy efficiency, e.g. in Central America: <https://www.giz.de/en/worldwide/13518.html>

¹⁷ For more information see: <http://www.international-climate-initiative.com/en/>

¹⁸ See <http://www.led-ca.net/>

Kazakhstan's renewable energy and energy efficiency market was released and in 2014, a trip for Kazakh business representatives to Germany was organized.¹⁹

In 2012, the BMW's export initiative Solar Roofs Programme²⁰, coordinated by the German Energy Agency (dena), donated and installed solar panels (10 kWp) on the roofs of the Baikonur space launch facility and the Eurasian National University of Astana.²¹ A similar project was implemented in Tajikistan. In addition, dena has been a key player in the Kazakh energy efficiency market. In 2013, it helped to set up an energy consultancy centre, providing advice, energy auditing and training courses on energy management (dena, 2012). Dena also set up the German-Kazakh Institute for Energy Efficiency and Management in Astana which trains politicians, energy professionals and academics (dena, 2014).

4. Prospects for German Engagement with Central Asia on Renewable Energy and Energy Efficiency

As an Energiewende pioneer and the largest bilateral EU partner in Central Asia, Germany is well positioned to foster the transition to a green economy in the region by sharing its renewable energy and energy efficiency know-how, technology and best practices. Technical support of the German government has already played a key role in encouraging the development of national climate mitigation and energy efficiency programmes in some countries of the region²².

Germany has a number of comparative advantages over the other big actors in the region: Russia, China and the United States of America. The country is already perceived by Central Asia as a reliable neutral partner which does not appear to have direct interests. Several latest German-supported initiatives, such as the Central Asia Water Initiative²³ and the Central Asian Countries Initiative for Land Management²⁴, have been instrumental in fostering regional cooperation. Last but not least, Germany is seen as a leader in quality technology and its successes in transition to renewable energy are admired, even if little of motivation behind the German Energiewende is understood.

4.1. External communication of the German Energiewende

The German Energiewende has a huge potential to serve as a showcase for other countries, also in Central Asia. Yet, the information about it is available mainly in German and English languages. Despite the great potential for renewables in the Russian-speaking world, information about the Energiewende in Russian language is very limited. The existing scarce materials are as a rule mere translation from German²⁵.

A brief review of the Central Asian media in Russian language indicates little understanding and a lot of misconceptions of the German Energiewende. In 2013, the Kazakh weekly newspaper Central Asia Monitor published an interview with Kazakh scientist Albert Bolotov. The article teaser ran: "Kazakhstan has chosen a "green" way of economic development [...]. Yet, the experience of some countries actively

¹⁹ For more information see: <http://bit.ly/ZuhaJX>

²⁰ For more information see: <http://bit.ly/1t5nGVO>

²¹ For more information see: <http://www.solardach-kasachstan.de/start>

²² For examples of such initiatives see <http://led-ca.net/> and <http://mitigationpartnership.net/newsletter-article-integrated->

[approach-development-climate-friendly-economies-central-asia](#)

²³ For more information see: <http://bit.ly/1uH2jrL>

²⁴ For more information see: <http://bit.ly/1BXLdwp>

²⁵ The following are translations into Russian: dena brochure "Renewables-Made in Germany" (bit.ly/1mGssW0) and the materials of the "Energy Transition" project by the Heinrich Böll Foundation (<http://energytransition.de/2013/03/ru/>)

promoting the use of renewable energy raises the question: will we manage such a daunting task? After all “green energy” is the prerogative of rich countries but even there it ruined many investors. Experts argue that this industry can only exist at a loss and only at taxpayers' costs.”²⁶ The journalist asks Bolotov, whether it makes sense to invest in renewable energy given that “Germany, one of the largest investors in “green” energy, starts to realize this is a way to bankruptcy” (Central Asia Monitor, 2013). Such negative narratives are likely to further hinder investments in renewable energy unless comprehensive information about the German Energiewende is available in Russian.

A substantial increase in targeted information in Russian, provided by the Federal Ministry for Economic Affairs and Energy (BMWi), the Federal Ministry the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), German political foundations, dena, the BMWi's Renewables-Made in Germany²⁷ initiative and other institutions is needed. It could be crucial in raising awareness and understanding of the benefits renewable energy and energy efficiency not only in Central Asia but also in the rest of the Russian-speaking world which reaches some 260 million people.

Germany could foster more political and social dialogue on renewable energy and energy efficiency in the region by (co-)sponsoring inter alia thematic conferences, internships and field trips to Germany for key players from Central Asia. According to the interviewed experts, such dialogue and exchange prove to work well and could further encourage public discussions of the benefits and challenges related to renewable energy in the region.

The German government should also consider intensifying support to programmes, fostering awareness among NGOs and journalists, specializing in energy issues in the region. Despite

relatively high levels of media censorship and NGO limitations in the region, these actors could with adequate support become crucial in forming public opinion on renewable energy deployment and energy efficiency measure. As a rule, energy and economic development are not perceived as politicized topics by largely authoritarian governments in Central Asia, which gives relative freedom for the engagement of local journalists and NGOs.

A few initiatives in that area already took place. The Central Asian Office of the Friedrich Ebert Foundation organized a workshop for Kazakh NGOs on low-emission development²⁸ whereas the Federal Foreign Office supported the exchange of Central Asian journalists on the regional water issues ²⁹. Support to such programmes could be intensified in each of the Central Asian countries.

4.2. Know-how and technology transfer

Legislation

One of the biggest barriers to deployment of renewable energy in Central Asia, mentioned by many experts, is the lack of legal frameworks and financial incentives to potential local and international investors. Most of the countries (except for Turkmenistan) have already introduced primary legislation on renewable energy and energy efficiency, yet the secondary legislation which would include guaranteed financial incentives, such as feed-in tariffs and tax exemptions is lacking.

Germany could consider intensifying its consultation and know-how transfer on legal frameworks (by-laws, norms, regulations) and financial incentives (fixed feed-in tariffs, tax exemptions, etc.) which would give guarantees to

²⁶ This is the author's translation of the article text from Russian language.

²⁷ www.renewables-made-in-germany.com/en is currently available only in German, Spanish and French languages.

²⁸ http://www.fes-sustainability.org/sites/default/files/Diskussionsteilnehmer/kaz_programme_final_neu.pdf

²⁹ For more information see www.n-ost.org/waterstories

the potential investors to renewable energy and energy efficiency. Such transfer could include bilateral consultations with the Central Asian governments and discussions within the German-Central Asian parliamentary group in the German Bundestag.

Private Sector

Public and international donor funding on its own is not enough to provide the needed level of investment to renewable energy and energy efficiency. The ultimate driver of the new investment is the private sector. Therefore, UNDP advises that de-risking mechanisms should be at the core of any strategy that promotes renewable energy (UNDP, 2014b).

To help stimulate the private sector in Central Asia Germany could scale-up its financial support (in the form of loans and grants facilitated by KfW), channel investments into joint enterprises in Central Asia, co-organize industrial fairs on sustainable energy technology in the region and intensify German-Central Asian business to business meetings. Germany could further build upon its Partnership on Mineral Resources with Kazakhstan, Kyrgyzstan and Tajikistan³⁰.

On energy efficiency one of the areas with high potential for know-how transfer is the renovation of multi-residential panel buildings, built in the 1960-1980s in Central Asia as well as in East Germany, and the improvement of insulation and heating systems. Currently many district heating installations and distribution systems are more than 50 years old and lose more than half of the heat they produce (UNDP, 2014b). This know-how transfer could be realized through German-Central Asian city partnerships or the EU Covenant of Mayors programme³¹. The focus should be made on simple and affordable technology.

Education

Germany should extend the education cooperation with Central Asia by introducing dual degree and vocational programmes and supporting university exchanges and research cooperation on sustainable energy. Such cooperation could significantly increase the currently very limited number of specialists in energy engineering and management. Currently, there is only one German University in Central Asia offering graduate and postgraduate programmes in energy, industrial and environmental engineering³². In 2013, dena helped to set up the German-Kazakh Institute for Energy Efficiency and Management. This cooperation could be extended to other countries in the region.

Germany could also provide consultancy support on the development of feasibility studies, economic analyses and investor guides on renewable energy, such as the UNDP-GEF Wind Power Market Development Initiative in Kazakhstan³³ and support programmes which scale up best practices in each Central Asian country. Further technical and financial support could be provided to the recently established Central Asian Regional Centre on Renewable Energy Sources under the Interstate Sustainable Development Commission of Central Asia³⁴.

Reservations of German businesses and government agencies with regard to corruption and non-transparent governance in the region need to be considered during the development of renewable energy and energy efficiency projects. Yet, though Central Asian regimes resist democratic change, they wish to be recognized as modern partners by Europe in order to strengthen their independence against the rising

³⁰ For more information on the Partnership see: www.ost-ausschuss.de/mineralische-rohstoffe-f-r-entwicklung-zentralasien

³¹ For more information see: <http://www.eumayors.eu/High-Level-Conference>

³² For more information about the German-Kazakh University see http://en.dku.kz/index.php?title=Main_Page

³³ For more information see: www.kz.undp.org/content/dam/kazakhstan/docs/UNDP_KAZ_wind_power_market.pdf

³⁴ For more information see: <http://bit.ly/1BF5JeA>

Chinese and the declining but still significant Russian influence (Boonstra, 2012).

4.3. Financial cooperation

In a situation, in which power generation from renewable energy sources is largely uncompetitive due to high fossil energy subsidies as well as high initial costs, it is key for the countries to introduce financial de-risking mechanisms (UNDP, 2014b). The German government could help enabling affordable loans through the KfW or the international development banks.

Another key area for German engagement is support to Central Asian countries in the development and introduction of micro-loan schemes (with low or zero interest rates) for farmers, families and small and medium enterprises, similar to the EBRD's Sustainable Energy Facility in Kyrgyzstan. German support could also be crucial in developing educational and exchange programmes for banks staff and investors in Central Asia.

4.4. Development cooperation

In Kyrgyzstan and Tajikistan the deteriorating energy supply infrastructure and insufficient energy access in distant rural areas makes a strong case for investment in decentralized, off-grid renewable energy power generation (small hydropower, solar and biomass). This applies, to a lesser extent, also to the other Central Asian countries. Decentralized renewable energy solutions can provide environmental and socio-economic benefits by delivering energy to households, hospitals and schools during energy or fuel shortages (UNDP, 2014b).

Currently, German development cooperation does not support any projects on renewable energy or energy efficiency. Yet, given its Energiewende experience the German government should consider extending its development cooperation portfolio with Central Asian countries to projects supporting sustainable energy supply in residential, industry and production areas.

4.5. Framework Central Asia Strategy

In 2007, the EU Central Asia Strategy initiated by the German 2007 EU Presidency was a crucial signal from the EU that Central Asia was perceived as an important partner and that the EU wants to expand its cooperation with the region (Flor, 2013). It brought the region to the radars of EU politicians and businesses, whereas the EU raised its profile and its engagement in Central Asia through diplomatic representations and various cooperation programmes.

Since 2013 this Strategy was not renewed. Upon its review in 2012, the decision was made it was still valid and no substantial changes were necessary. However, the EU has been gradually downscaling its political engagement in the region. In 2014, the position of the EU Special Representative on Central Asia, who used to be a high representative and the key EU person in the region, was replaced by the EU Special Envoy lacking the "necessary political clout" (Boonstra, 2014).

Meanwhile, Germany has no specific and up-to-date strategy for Central Asia either. The latest BMZ development cooperation strategy with Central Asia dates back to 2005. BMZ is currently updating it, but it is not clear in which form and when it will be released. The page on the EU Strategy for Central Asia on the website of the Federal Foreign Office was last updated in October 2012 and does not reflect latest developments in German/EU relations with the region (Auswärtiges Amt, 2012).

A renewed EU/German Strategy for Central Asia is needed, as it would send a strong signal both within the EU and Germany as well as in Central Asia that the region is still seen as an important cooperation partner. Germany should initiate and promote a reviewed and targeted version of the Central Asia strategy. The new strategy should focus on fewer areas and tangible development projects, where it can really make a difference. One of key areas of the new strategy should be cooperation in the field of renewable energy and energy efficiency as well as transition to a low-carbon economy.

5. Conclusion

Despite the enormous potential of renewable energy in Central Asia, its actual deployment in the region remains very low. Due to high fossil fuel subsidies and low electricity prices on-grid power generation from renewable energy remains largely uncompetitive. Potential investors in the region have either limited or no access to affordable bank loans and often cannot afford relatively high initial investment costs. Furthermore, the number of local technology providers and specialists on sustainable energy as well as reliable renewable energy feasibility studies in Central Asia are limited.

Still, one can see positive developments the renewable energy and energy efficiency sector across Central Asia. All countries of the region with the exception of Turkmenistan have adopted primary legislation on renewable energy and energy efficiency and formally introduced a number of financial incentives. Although renewable energy is still seen as a prerogative of rich countries, interest in energy efficiency measures across Central Asia is growing. Kazakhstan, Uzbekistan and Turkmenistan see it as a way of increasing their oil and gas exports, whereas Tajikistan and Kyrgyzstan hope to reduce their dependence on energy imports from the neighbouring countries.

Given the growth of interest in renewable energy and especially energy efficiency in the region, Germany should not miss the chance of strengthening its position as a key partner in the growing Central Asian market. As an Energiewende pioneer and the largest EU bilateral partner, Germany can support the Central Asian governments in realizing their vast renewable energy potentials and accelerating their slow and rather unwilling pace of transition to green economies.

The following priority areas for German engagement with Central Asia were identified. As a first step, the German government should increase targeted information about the German Energiewende in Russian language. Conferences

and field trips on the Energiewende for key stakeholders from Central Asia could foster public discussion of the renewable energy benefits and challenges and raise public awareness in the region. Also, the German government, political foundations and other actors should consider intensifying support to local programmes, fostering awareness among NGOs and journalists.

Germany should intensify its know-how transfer on legal frameworks and financial mechanisms which would foster investments in renewable energy and energy efficiency in Central Asia. To fill the gap in local renewable energy specialists and technology providers, Germany should increase its educational and research cooperation in this field with Central Asia. Germany could also provide consultancy support on the development of economic analyses of renewable energy in the region.

Germany should extend its financial and development cooperation with the region to programmes on renewable energy and energy efficiency (BMZ, BMWi, KfW). For that the German government could support Central Asian countries in the development and introduction of micro-loan schemes and support programmes on decentralized renewable energy generation especially in rural areas of the region.

Finally, Germany should promote a new targeted Framework Central Asia strategy of the EU with a strong focus on sustainable energy cooperation and include cooperation on renewables into its currently being updated BMZ Central Asia strategy. Such strategies send crucial signals to German and Central Asian businesses and other key actors that the region is still seen as a strategic partner.

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Marion Dönhoff Working Papers

The “Dönhoff Fellowship Working Papers” is the publishing format for the results of the individual work from the Marion Dönhoff fellows at the Michael Succow Foundation. The fellowship programme is intended to support open and multidisciplinary debates in the areas of environmental journalism, political ecology and sustainable development and to foster a critical East-West dialogue. The target regions are post-soviet countries, including the South Caucasus and Central Asia. As a result of in-depth analyses of specific environmental subjects, including approaches for the solution of environmental problems in the target regions, the “Dönhoff Fellowship Working Papers” are a potential basis for further action in environmental protection and sustainable development