FRIEDRICH EBERT STIFTUNG

STUDY

Energy Transition in South East and Eastern Europe, South Caucasus and Central Asia

Challenges, Opportunities and Best Practices on Renewable Energy and Energy Efficiency

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December 2018

- Countries in South East and Eastern Europe, South Caucasus and Central Asia have enormous potential for renewable energy and energy saving. Energy transition could help in the solution of pressing energy security and health issues, boost economic growth and contribute to democratization and peace building in the region. In the coming years, many countries will have to replace their aging and inefficient fossil fuel and nuclear energy infrastructure, which opens up a great opportunity for advancing the transformation of the energy sector towards clean energy.

- Currently, multiple political, financial, technical and social barriers hinder the rapid uptake of renewable energy technologies and energy efficiency measures in the region. These barriers translate into high investment risks and a high cost of capital, which, together with limited access to finance, further delay the energy transition.

- With the targeted and concerted technical and financial cooperation of German, EU and international stakeholders, the countries in the region could accelerate their energy transition and decarbonisation processes, improving their own social-economic situation and contributing to global efforts to stop global warming. Some successful initiatives and best practices on renewable energy and energy efficiency in the region, if scaled up, could have a positive spillover effect in the region.

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1. Introduction

Over the past ten years, renewable energy has been developing rapidly. Favourable policies and support mechanisms have driven investment and technological advances, leading to sharp cost reductions and the exponential growth of renewable energy installations worldwide.

Since 2009, costs of solar PV modules have fallen by 80 per cent and wind technology prices have fallen by almost a third (IRENA 2017). In many parts of the world renewable energy is now cost-competitive or cheaper than fossil fuel and nuclear power generation.

In 2017, renewable energy sources accounted for more than half of the new power generation capacity added worldwide (Clark 2017). The greater part of these investments were driven by emerging and developing economies, especially China, Brazil and India, which committed 177 billion US dollars to renewable energy, compared with 103 billion US dollars by developed countries (FS/UNEP 2018).

Growing energy demand, economies of scale and growing air pollution and health concerns will provide further stimulus for shifting the energy sector to renewable energy. In addition, increasing action on climate change and the environment, including due to countries' commitments under the Paris Agreement, and the growing global trend of divesting fossil fuel assets are expected to further accelerate the transition to renewables and efficiency across the world.

In South East and Eastern Europe, South Caucasus and Central Asia, however, the deployment of renewable energy technology and energy efficiency measures remains rather slow, despite the very high technical potential of renewables and energy saving in the region. Meanwhile, a few recent studies indicate that decarbonisation of energy systems in the countries of the region is technically feasible and would be beneficial from the social, economic and the environmental points of view.

In the run-up to the United Nations climate change conference COP24 in Poland in December 2018, the Friedrich-Ebert-Stiftung Central and Eastern European department has commissioned this research on challenges, opportunities and best practices on energy transition in the region.[1]

This publication provides an overview of the latest developments and policies on renewable energy[2] and energy efficiency; it also examines the major barriers and driving forces for their deployment in the region. The report also presents three best practices on renewable energy and energy efficiency, which have high scale-up potential in other countries of the region. Finally, the report elaborates on the role that external actors, including Germany, the European Union and international organizations, could play in fostering the energy transition in the region and concludes with policy recommendations.

The research for this publication was based on interviews[3] with energy experts from the region and international experts working in the countries, as well as on the existing literature and studies.

The countries of the region that are EU members were left outside the scope of this report for several reasons: (i) EU members have different requirements as regards their legal and regulatory framework on energy, as well as different opportunities and financial support within EU regulations; and (ii) there are numerous studies and projects that cover or analyse EU members' progress on climate and energy targets and monitor the various drivers and barriers, framing the diffusion of renewable energy technologies.[4]

As for the target countries for this report, there are still only a limited number of recent studies and analyses on renewable energy and energy saving potential and developments. Meanwhile, the countries in the early phase of considering an energy transition have a chance to learn from the experiences of others and to leapfrog their mistakes.

1. The following regions and countries were covered by the research for this publication: South East Europe (Albania, Bosnia and Herzegovina, Kosovo, FYR of Macedonia, Montenegro and Serbia), Eastern Europe (Belarus, Moldova, Russia and Ukraine), South Caucasus (Armenia, Azerbaijan and Georgia) and Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan).

2. Unless otherwise specified, the term »renewable energy« refers in this paper to solar, wind, small and medium hydropower (less than 10MW), geothermal and biomass energy.

3. The full list of interviewees can be found at the end of the report.

4. For reference see, for instance, the databases of RES-legal http://www.res-legal.eu/ and RE-frame https://www.re-frame.eu/.

The Special Report by the Intergovernmental Panel on Climate Change (IPCC) on Global Warming of 1.5 °C, released in October 2018, has confirmed that, although currently off-track, the global community can still achieve the target of limiting global warming to 1.5 °C, but to do so »rapid, far-reaching and unprecedented transitions« across sectors and countries will be needed (IPCC 2018).

This publication aims to provide knowledge and to contribute to dialogue and discussions on ways to overcome challenges and use opportunities to accelerate energy transition and the decarbonisation process in the countries of South East and Eastern Europe, South Caucasus and Central Asia, contributing to global efforts to tackle climate change.

2. Overview of the Energy Sector in the Region

2.1 Status Quo of the Energy Sector in the Region

The countries of South East and Eastern Europe, South Caucasus and Central Asia differ considerably in terms of their geography, territory and population size, as well as their political and socio-economic development. However, many similarities can be found in the ways their energy systems are structured and have developed. The countries of the region therefore often face similar challenges in the deployment of renewable energy technologies and improving energy efficiency.

Over the past two decades, these countries have faced a number of challenges, affecting their economic growth. They include the economic crisis of the 1990s, which resulted in the restructuring and downsizing of energy-intensive industries; the 2008–2009 economic downturn; and a range of external shocks, including low oil prices (UNECE/REN21 2017). The level of economic development across countries still shows major gaps. In 2017, gross domestic product (GDP) per capita (at purchasing power parity) ranged from 10,743 US dollars in the Russian Federation to 801 US dollars in Tajikistan (World Bank 2017), a more than tenfold difference.

Most the countries in the region depend heavily on imports of fossil fuel energy (oil and/or gas), making it a security issue. The majority of the countries are net energy importers with imports exceeding 30 per cent. In Armenia, Belarus and Georgia net energy imports account for more than 60 per cent of energy use. The extreme case is Moldova, whose energy imports are as high as 90 per cent (UNECE/REN21 2017).

Overall, in their total primary energy supply, the countries of the region remain extremely dependent on the use of fossil fuel and nuclear energy resources (see Figure 1). In 2014, conventional sources accounted for almost 90 per cent of the total primary energy supply in the region.

Five countries – Azerbaijan, Kazakhstan, Russia, Turkmenistan and Uzbekistan – are net energy exporters, due to their large oil and gas reserves. Apart from that, Bosnia and Herzegovina, Kazakhstan, Montenegro, Russia, Serbia and Ukraine have significant coal reserves, while Belarus and (again) Russia have peat deposits (ibid).

Fossil fuel and nuclear energy subsidies are present throughout the region in both net energy exporting and importing countries. The percentage of energy subsidies in the region's GDP is one of the highest in the world, ranging from 61 per cent in Ukraine, through 37 per cent in Bosnia and Herzegovina and 35 per cent in Serbia to 4 per cent in Armenia and 2 per cent in Albania (ibid). Through subsidies to the state-owned utilities, retail electricity prices and tariffs for households and industries are kept artificially low and well below their cost-recovery levels.

Most countries of the region have inherited energy supply infrastructure from the Soviet era, characterized by strong centralization, monopolies and large-scale and inefficient energy generation facilities. In many cases, government officials at the local and national level have vested interests or close ties with energy business structures, with little or no interest in changing the status quo. The number of energy providers and utilities is limited, leading to extremely difficult market entry for new players, as well as little or no competition on the energy market.[5]

Power generation, transmission and distribution infrastructure is aging, poorly maintained and often operating beyond its design life in several countries of the re-

5. These characteristics are elaborated in more detail in Section 4 on challenges and barriers to the deployment of renewable energy and energy efficiency.

gion. This leads to high losses in the networks and significant inefficiencies in heating systems. As a result, power outages still occur in several countries, especially in the South Caucasus and Central Asia. In Central Asia, improvements have been made, but transmission and distribution losses still remain high, at 20 per cent in Kyrgyzstan and 15 per cent in Tajikistan in 2013 (World Bank 2013). In South East Europe, the highest losses were reported in Albania (33 per cent) and Montenegro (21 per cent) (UNECE/REN21 2017).

As for total final consumption (TFC), the major energy consumers are the residential sector (more than 30 per cent in ten countries of the region) and the transport sector (more than 25 per cent of TFC in ten countries). Surprisingly, the industry sector accounts for 15 per cent of TFC on average in all covered countries, but with significant disparities among countries (ibid).

2.2 Regional Energy Cooperation

The most frequent argument of detractors and sceptics concerning renewable energy sources is that their variability[6] at high levels of deployment may endanger security and the balance between energy supply and demand across a power system. But variability and fluctuating demand and supply are not new challenges for energy systems, and the need for better forecasting, flexibility of resources and grid stability has long been understood. A key factor that significantly facilitates the integration and balancing of renewables in energy systems is regional energy cooperation and interconnectivity.

In the countries of the Western Balkans and Eastern Europe, Central Asia and South Caucasus, numerous interconnections between power grids were established across national borders during the Soviet era, but in many cases were either abandoned or have deteriorated over recent decades. The existing infrastructure and interconnections could be re-established and improved, however, which would help to overcome many of the technical challenges of renewable energy deployment.

Several initiatives and organizations are already working on regional energy cooperation and could potentially foster developments on renewable energy and energy efficiency. Although none of the countries covered by this report are EU members, the European Union is currently the most important driver and financial supporter of energy and especially sustainable energy cooperation across the region.

An important institutional advocate and watchdog on transition to renewable energy is the Energy Community, an international organization established by the European Union and nine contracting parties: Albania, Bosnia and Herzegovina, Kosovo, FYR Macedonia, Montenegro and Serbia, as well as Moldova, Ukraine and most recently Georgia. The aim of the organization is to »create an integrated and sustainable pan-European energy market«.

The role of the Energy Community is especially important at the regulatory level, as its members pledged to transpose EU energy legislation, including implementation of the EU Renewable Energy Directive, the introduction of binding renewable energy and energy efficiency targets by 2020 and liberalization of the energy markets. Over the course of 2018–2019, Energy Community members, just like EU members, are supposed to develop National Energy and Climate Plans (NECP) and discuss setting new national targets on reducing greenhouse gas emissions and accelerating energy transition.

The current progress of the member countries remains much slower than needed (cf. Energy Community 2018a) and more urgency is required. Weak implementation has partly to do with the fact that the Energy Community lacks enforcement mechanisms, which would include sanctions in case of non-compliance (Mileusnic 2015). The countries that have performed better than others – Montenegro, Serbia and FYR Macedonia – have EU candidate status,[7] which represents stronger leverage in advancing the pace of renewable energy policies and energy market reforms.

Efforts on strengthening regional energy cooperation are being currently made in Albania, Bosnia and Herzegovina, Kosovo, FYI of Macedonia, Montenegro and Serbia under the auspices of the Western Balkans 6 In-

6. Solar, wind, wave and tidal energy are often referred to as variable renewable energy sources because of their fluctuations over the course of the day and from season to season.

7. The following countries in the region have EU candidate status: Albania, FYR Macedonia, Montenegro and Serbia. Bosnia and Herzegovina and Kosovo have applied, but have not yet been granted EU candidate country status.

itiative, launched in 2014 with the support of the Energy Community. The initiative provides technical capacity and investment grants to enable the establishment of a regional electricity market, cross-border balancing and trading. Here, too, progress is slower than needed, and more efforts are needed to make sure that the countries implement their commitments under the initiative.

Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine are covered by the Eastern Partnership within the framework of the European Neighbourhood Policy. The Eastern Partnership[8] provides significant technical and financial cooperation across several sectors, including strengthening economic development and investment climate, the rule of law and governance, as well as the energy sector's connectivity and efficiency. Cooperation is being implemented via either bilateral association agreements (signed by Georgia, Moldova and Ukraine) or regional cooperation instruments, such as the Eastern Europe Energy Efficiency and Endowment Partnership[9] (EU Neighbours 2017).

In 2016, the EU set up a four-year new regional collaboration framework programme EU4Energy focused on the Eastern Partnership countries and Central Asia,[10] together with the Energy Community, the International Energy Agency (IEA) and the Energy Charter (EU4Energy 2017a). This programme has strong potential to improve countries' capacities as regards energy data collection and monitoring, as well as their legislative and regulatory frameworks on energy.

Except for Turkmenistan and Uzbekistan, all countries have at least one city participating as a signatory in the EU Covenant of Mayors for Climate and Energy Initiative. Signatories, ranging from small villages to large cities, commit themselves to a voluntary reduction of 40 per cent greenhouse gas emissions by 2030 and submit Sustainable Energy Action and Climate Action Plans, outlining the key actions they plan to take. The implementation progress of these plans depends largely on the personal engagement of mayors' offices, as well as civil society, and varies extensively across the region.

All the countries in the region are members of the International Renewable Energy Agency (IRENA). In 2016–2017, IRENA launched two very promising regional initiatives on South East Europe and Central Asia, which should help to accelerate the uptake of renewable energy in the regions by providing support to policymakers and investors.

The South East Europe Regional Initiative[11] includes technical cooperation in assessing potential and socio-economic benefits of renewable energy, training on energy policy and regulatory frameworks, energy statistics as well as the integration of renewable energy sources in power grids. The initiative cooperates on many occasions with the Energy Community Secretariat and both programmes seem to complement each other in technical cooperation on renewables with the region.

The Central Asia Regional Initiative[12] has so far been less extensive in its scope and has included several consultative meetings and workshops with the governments and other stakeholders of the region. There is strong potential to increase this cooperation, however, given the latest positive developments in the region. In April 2018, the media reported a restart of electricity trading between Tajikistan and Uzbekistan, following the diplomatic meltdown between the two countries (Putz 2018). Back in 2009, Uzbekistan withdrew from the regional grid, putting an end to cross-country electricity trading in Central Asia.

The Asian Development Bank supports the Central Asia Regional Economic Cooperation Program (CAREC), which covers energy among other topics and includes Azerbaijan, Georgia, Tajikistan, Turkmenistan and Uzbekistan as cooperation partners. CAREC's strategy and work plan for 2016–2020 includes technical support for renewables (UNECE/REN21 2017) via consultations and workshops.

Several other regional initiatives have less or no focus on renewables. But their work on cross-regional electricity

8. A full list of projects, implemented by the Eastern Partnership can be found here: https://www.euneighbours.eu/en/east/eu-in-action/projects.

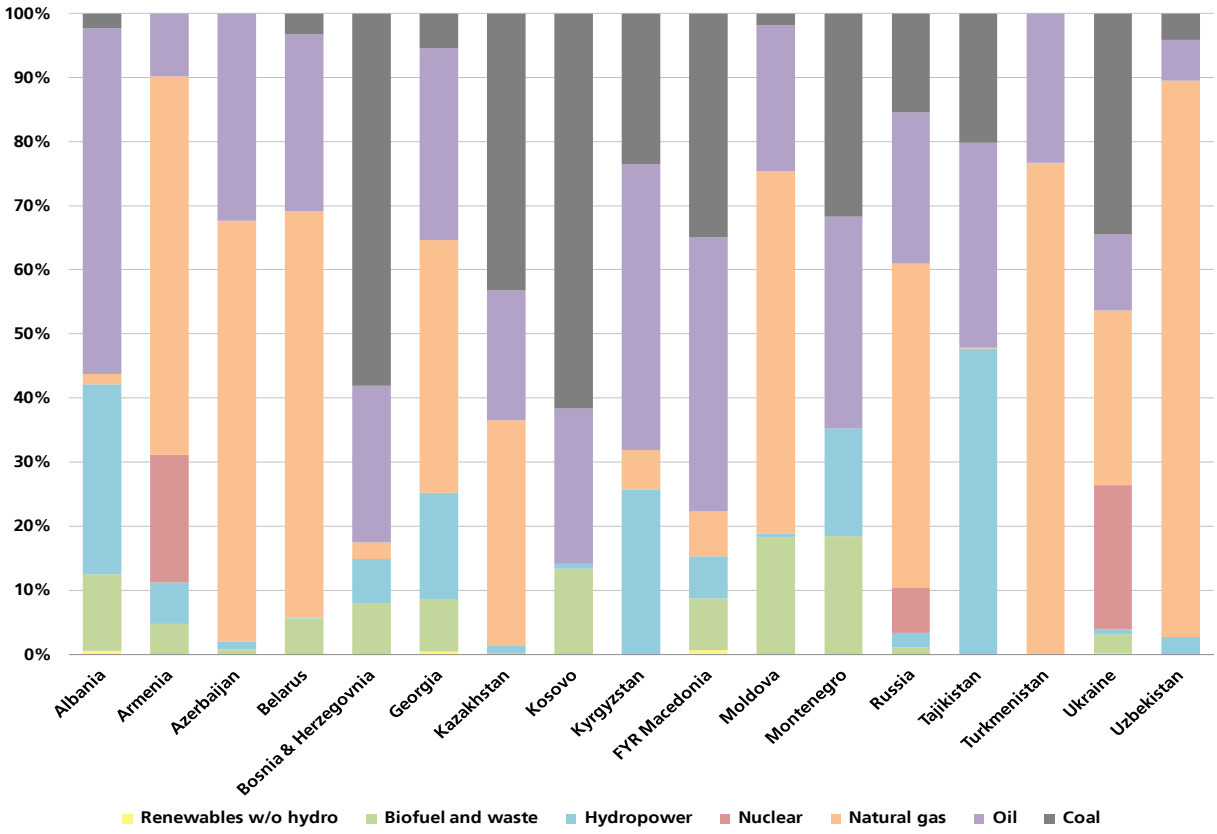
9. The Eastern Europe Energy Efficiency and Environment Partnership (E5P) is a multi-donor fund established for 2011–2019 by the EU and international financing institutions, which provides grants and loans for energy efficiency projects in municipalities. For more information see: https://www.euneighbours.eu/en/east/stay-informed/projects/eu4energy-eastern-europe-energy-efficiency-and-environment-partnership.

10. The EU4Energy Programme includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

11. For more information see: https://www.irena.org/europe/South-East-Europe-Regional-Initiative.

12. For more information see: https://www.irena.org/asiapacific/Central-Asia-regional-initiative.

Figure 1: Total Primary Energy Supply by Source 2016



Source: Author's compilation, based on IEA statistics, 2016.

trading could either be potentially expanded to cooperation on renewable energy or is important to consider for other regional programmes. The World Bank and the EBRD co-finance the Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000[13]), which should make it possible to transfer surplus summer electricity from hydropower in Kyrgyzstan and Tajikistan to meet growing demand in Afghanistan and Pakistan. The project plans include the construction of high voltage transmission infrastructure and technical assistance.

Countries of Eastern Europe, South Caucasus and Central Asia are represented in China's controversial »Belt and Road Initiative«, in which renewable energy is only a small pillar among myriad large-scale infrastructure and fossil fuel projects. It includes plans on construction of new coal power plants in the region, which would lock the countries into coal assets for decades, further damaging people's health and the environment, and aggravating climate change. The conditions of these contracts are often questionable and could result in involuntary handover of critical infrastructure to China (Cameron 2018). In this light, the EU engagement with the region on renewable energy and energy efficiency becomes even more critical.

Russia, Kazakhstan, Belarus, Armenia and Kyrgyzstan are members of the Eurasian Economic Union (EAEU), which intends to create a common electricity market by 2019, and common oil and gas markets by 2025. The bloc's current record shows that Russia's geopolitical interests have so far overpowered economic or trade considerations (Dragneva 2018) and the creation of these markets remains questionable. Nevertheless, it is important that the EU seeks strategic dialogue with the EAEU at the technical and regulatory level – which has been missing so far – in light of some of the latest devel-

13. For more information see http://projects.worldbank.org/P145054?lang=en.

opments[14] in the union and growing potential for conflicts of interest with the EU over the integration of energy markets in Eastern Partnership countries (Pastukhova and Westphal 2018).

3. Overview of Renewable Energy and Energy Efficiency in the Region

3.1 Technical and Cost-competitive Potential and Feasibility

The good news is that the region has a vast potential for the deployment of renewable energy technologies and energy efficiency measures and energy transition is already technically feasible. Robust assessments of technical potential and feasibility in the region, however, as well as analyses of the socio-economic benefits of energy transition in the countries remain limited and definitely need to be increased. In this section a few recent studies and their findings are summarized.

The only recent comprehensive report on all the countries of South East and Eastern Europe, South Caucasus and Central Asia covered by this research, with the exception of Kosovo, was prepared by the United Nations Economic Commission for Europe (UNECE) and the Renewable Energy Policy Network for the 21st Century (REN21) in 2017. It gives an overview of renewable energy and energy efficiency trends, policies and investment flows across the power, heating and transport sectors and looks into opportunities and barriers for energy transition in the region.

The latest analysis of the potential for cost-competitive renewable power generation in South East Europe[15] was carried out by IRENA in 2017 (IRENA 2017). The report shows that renewable energy sources are already a viable energy generation option. Although only 17 per cent of the identified overall technical potential of the vast renewable energy potential in the region could be implemented in a cost-competitive way[16] today, this potential could be significantly higher if the investment climate and security in the region is improved.[17]

Apart from that, the rigorous analysis by the South-East Europe Electricity Roadmap[18] (SEERMAP) project consortium in 2017 examines three scenarios for decarbonizing the electricity market in South East Europe[19] and its impact on energy security, electricity prices, CO_2 emissions and the economic situation in the relevant countries. The main conclusion of the study is that focusing on the deployment of renewable energy sources would be a no-regret action in all scenarios and would have a positive impact on GDP and employment. It also shows that the stable policy framework, investment security and regional cooperation would be key factors, defining the pace and success of energy transition (SEERMAP 2017).

The latest regional studies on South Caucasus and Central Asia date back to 2015[20] and provide an overview of the latest renewable energy and energy efficiency developments and policies, as well as barriers and opportunities for energy transitions in these regions.

As for transition progress in individual countries, the Energy Community annual implementation reports take regular stock of the latest developments in the renewable energy sector and energy efficiency in the member countries and their compliance with EU energy legislation. Ukraine and Russia were covered by IRENA's Remap, which reviewed renewable energy prospects in both countries up to 2030. In 2014, the United Nations Development Programme (UNDP) released renewable energy snapshots of the countries and territories in the Europe and CIS region, with short summaries of the investment climate, policies and projects on renewable energy (UNDP 2014b).

Several recent country studies – including the 2017 studies on Kazakhstan and Ukraine by the Lappeenranta University of Technology and the Energy Watch Group

14. For an analysis of the latest developments in the creation of energy markets in the EAEU see Pastukhova and Westphal, 2018.

15. The IRENA report covered Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Montenegro, Moldova, Romania, Serbia, Slovenia, FYI Macedonia and Ukraine.

16. The report considered renewable energy potential cost-competitive only if the levelized cost of electricity (LCOE) of its generation is within the ranges of electricity cost, produced by fossil fuel options (IRENA 2017).

17. The interdependence of investment security and climate with cost of capital, a crucial factor for the cost-competitiveness of renewable energy technologies, is elaborated in Section 4 on challenges and barriers.

18. The study covered nine countries in South East Europe: Albania, Bosnia and Herzegovina, Kosovo, FYR Macedonia, Montenegro and Serbia, covered by this research, and Bulgaria, Greece and Romania.

19. The 2017 SEERMAP Roadmap covered Albania, Bosnia and Herzegovina, Bulgaria, Greece, Kosovo, FYR of Macedonia, Montenegro, Romania and Serbia.

20. For reference see Opitz 2015 and Nabiyeva 2015.

Table 1: Overview of Renewable Energy Policies by Country

		Regulatory Policies					
	Renewable Energy Target	Biofuels obligation /mandate	Electric Utility Quota Obligation / RPS	Feed-in Tariff / Premium Payment	Heat Obligation / Mandate	Net Metering	Tendering
Albania	✓	✓	✓	✓	✗	✗	✓
Armenia	✓	✗	✗	✓	✗	✓	✗
Azerbaijan	✓	✗	✗	✓	✗	✗	✗
Belarus	✓	✓	✓	✓	✗	✓	✗
Bosnia and Herzegovina	✓	✓	✗	✓	✗	✗	✓
Georgia	✗	✗	✗	✓	✗	✓	✓
Kazakhstan	✓	✗	✗	✓	✗	✗	✓
Kyrgyzstan	✓	✗	✗	✓	✗	✗	✗
FYR of Macedonia	✓	✗	✗	✓	✗	✗	✗
Moldova	✓	✗	✗	✓	✗	✗	✗
Montenegro	✓	✗	✓	✓	✓	✓	✓
Russian Federation	✓	✗	✓	✗	✗	✗	✓
Serbia	✓	✗	✗	✓	✗	✗	✗
Tajikistan	✓	✗	✗	✗	✗	✗	✗
Turkmenistan	✗	✗	✗	✗	✗	✗	✗
Ukraine	✓	✗	✗	✓	✗	✓	✗
Uzbekistan	✓	✗	✗	✗	✗	✗	✗

Source: UNECE/REN21 Renewable Energy Status Report 2017

(Child et al. 2017 and Bogdanov 2017), as well as the Heinrich-Böll-Stiftung study on Ukraine, released in 2017 (Heinrich-Böll-Stiftung 2017) – show that a transition of electricity sector to 100 per cent renewable energy by 2050 would be technically feasible and cost-efficient. The 2018 report by Germanwatch shows that phasing in renewables and phasing out coal in Kosovo would be beneficial for the country and offers solutions for overcoming barriers to energy transition (Germanwatch 2018).

3.2 Regulatory Landscape

The second good news is that all countries of the region, with the exception of Turkmenistan, have strategic documents outlining their priorities for at least one renewable energy technology. Not surprisingly, there is significantly more progress on the adoption of secondary legislation on regulatory and financial mechanisms for renewable energy support in the countries that are members of the Energy Community[21] than in other countries of the region, due to their obligations on transposing EU energy legislation.

The regulatory landscape looks as follows: Albania, Bosnia and Herzegovina, Kazakhstan, FYR of Macedonia, Montenegro, Moldova, Serbia and Ukraine have renewable energy action plans at the national level. Belarus and Ukraine have approved their National Action Plans on energy efficiency. Armenia and Uzbekistan have developed roadmaps for the development of some renewable energy sources, and Azerbaijan, Belarus, Georgia and Kyrgyzstan have state programmes on the development of renewable energy (UNECE/REN21 2017).

As of 2016, all countries in the region, with the exception of Turkmenistan and Georgia, had renewable energy targets for installed capacity or for the share of renewables in the energy or electricity mix. These targets are far from ambitious, but provide an important basis for planning and monitoring the progress of the countries, as well as some investment security. The targets and policies on renewable energy focus mainly on power generation.

21. This refers to a lesser extent to Georgia, which became a member of the Energy Community in 2017 and is still picking up the pace on implementing its obligations.

It is normal global practice to use political and financial mechanisms and incentives, including a guaranteed right to grid access, feed-in-tariff (FIT) system and tax exemptions for renewable energy producers to ensure the uptake and mainstreaming of renewable energy technologies in markets that are not yet developed. In later phases of market development, feed-in premium systems[22] and auctions may be introduced. The latter would be counterproductive in the early phase of market development as they limit competition to large companies and exclude investments from decentralized actors, such as cooperatives, smaller and medium-sized enterprises and communities (cf. Ram et al. 2017). Auctions are connected with higher risks for investors in comparison with feed-in tariffs, which guarantee predictable revenues for investors, and can be more opaque than the FIT support.

As of 2016, most of the countries, except for Russia, Tajikistan, Turkmenistan and Uzbekistan, had adopted the FIT system provisions. In 2016, Ukraine modified its FIT policy by scrapping the local content requirement, which was introduced earlier to profit several oligarchs, and introducing a premium on local content in addition to the FIT. Armenia, Belarus, Georgia, Moldova, Montenegro and Ukraine enforced net metering or net billing[23] programmes. Net metering helps to reduce electricity costs for distributed small-scale renewable energy generation (UNECE/REN21 2017).

Auctions are used in seven countries (Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, Russia and, since 2018, Kazakhstan). In accordance with the Energy Community's requirements, its members are supposed to move gradually from feed-in tariffs to feed-in premium systems and to start preparations for shifting to the auction system. But as mentioned earlier, auctions can be counterproductive in the market in the early stages of development. In some countries that introduced auctions, for example, Kazakhstan and Bosnia and Herzegovina, non-transparent and bureaucratic bidding processes were reported.

22. Under a feed-in premium (FIP) scheme, renewable energy producers receive either a fixed or a sliding premium on top of the market price of the produced electricity.

23. Net metering enables utility customers who have installed their own renewable energy generating systems to pay only for the net electricity delivered from the utility (total consumption minus on-site self-generation). A variation that employs two meters with differing tariffs for purchasing electricity and exporting excess electricity off-site is called »net billing« (UNECE/REN21 2017).

3.3 Latest Developments and Trends

Here the bad news starts to appear: despite the high potential of renewable energy sources in the region, it remains largely untapped, with the exception of controversial large hydropower.

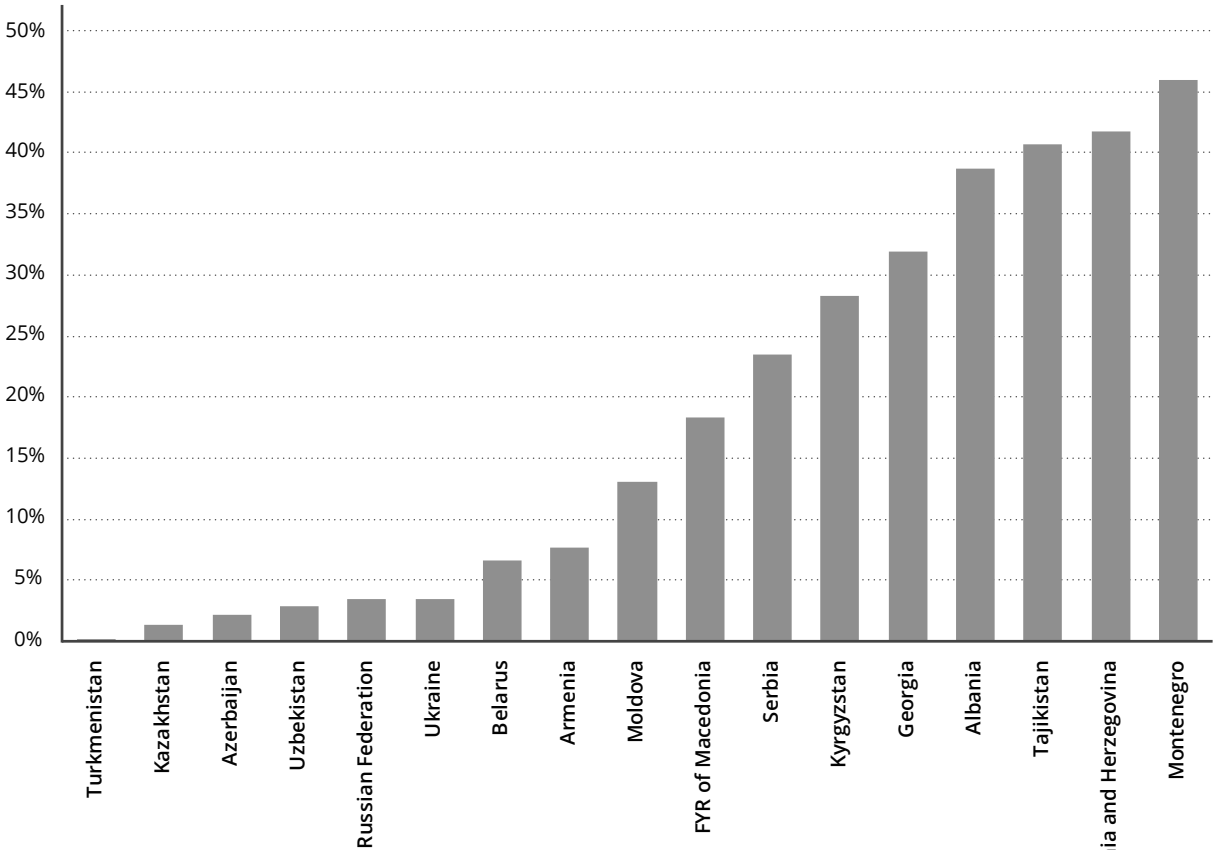
Over recent years, there has been almost no significant progress on the deployment of renewable energy in the countries of South East and Eastern Europe, South Caucasus and Central Asia. During 2015 and 2016, the region[24] added only a little over 2 GW of renewable power capacity, with hydropower accounting for 70 per cent of these additions (UNECE/REN21 2017). By comparison, the United Kingdom alone installed 2 GW of solar PV in 2016 (Bellini 2017) and Germany installed 5 GW of onshore wind energy the same year (WindEurope 2017). By the end of 2016, total installed renewable power capacity in the entire region reached 85.4 GW. That was less than the total installed renewable power capacity in Germany, which reached 104 GW in 2016 (BMWi 2018).

The following countries – Macedonia, Albania, Bosnia and Herzegovina, Georgia, Tajikistan and Kyrgyzstan – have historically high shares of hydropower. With large hydropower included, shares of renewable energy in total final energy consumption vary from less than 5 per cent in Turkmenistan, Kazakhstan, Uzbekistan, Azerbaijan, Russia and Ukraine to over 40 per cent in Bosnia and Herzegovina and Montenegro (see Figure 2).

Although large hydropower is officially counted as a renewable energy source by most international organiza-

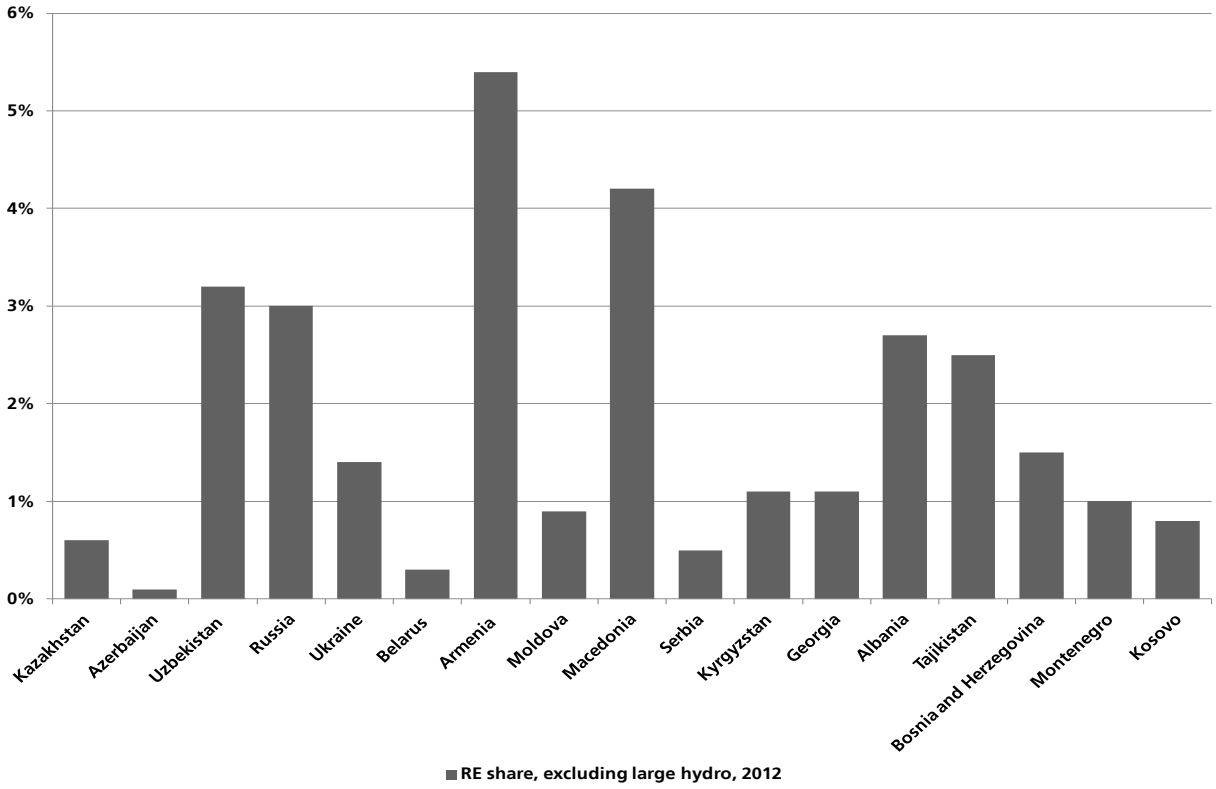
24. This figure does not include Kosovo, as the UNECE/REN 21 report did not cover it.

Figure 2: Share of renewable energy in total final energy consumption by country, 2014



Source: UNECE/REN21 Renewable Energy Status Report 2017

Figure 3: Share of renewable energy, excluding large hydropower, in electricity generation by country, 2012



Source: UNDP Renewable Energy Snapshots 2014

tions, including IRENA, its use is highly controversial due to its numerous negative effects on the environment and local ecosystems, as well as displacement of local communities (cf. Rivernet 2003). Water storage reservoirs, created for hydropower dams, have also been proved to be a significant source of greenhouse gas emissions (Weiser 2016).

Large hydropower is often used by politicians to showcase their commitment to renewable energy. But including large hydropower in statistics on renewables, as a rule, does not show the real dynamics and new developments in the sector. Compare, for instance, the shares of renewable energy in electricity generation in the region, excluding large hydropower (Figure 3). In that case, renewable energy shares in most of the countries of the region hardly reach 3 per cent, with only Armenia and Macedonia reaching slightly over 4 per cent.[25]

Despite their smaller impact on the environment, small hydropower plants[26] also have numerous negative effects. For instance, in the Western Balkans 49 per cent of all projected hydropower plants, most of them small, are in national parks, protected areas and biodiversity hotspots. Many of these projects endanger the local communities that are dependent on these rivers for drinking water. In some cases these projects are being implemented by companies with close connections to the government (cf. Bankwatch 2018; Schwarz 2015). Therefore small hydropower projects should also be thoroughly scrutinized when considering different renewable energy technologies.

Besides hydropower, some progress was made in Ukraine, Kazakhstan and Russia in the period 2015–2016 (UNECE/REN21 2017). Ukraine is the largest solar PV market in the region. Due to the feed-in-tariff programme, its cumula-

25. Data on renewable energy shares, excluding large hydropower, is difficult to find, as most organizations include it in their statistics. The data presented in Figure 3 dates back to 2012, therefore slight changes might have taken place since then.

26. Small hydropower projects include multiple small hydro projects in Armenia under the Clean Development Mechanism. Georgia is developing several projects through the state Energy Development Fund. Kyrgyzstan is developing 20MW of small hydropower projects with the technical assistance of the Global Environment Facility (GEF) and the UNDP (UNECE/REN21 2017).

tive solar PV installed capacity has almost doubled since 2012. By the end of 2018, the country is set to reach 1GW of installed solar PV capacity (Bellini 2018).

In 2015–2016, Kazakhstan[27] led in new wind capacity installations, followed by Russia, Belarus, Ukraine and Serbia. Belarus added 45.5 MW of wind power capacity in 2015–2016, including its largest wind farm of 7.5 MW in Navahrudak district. In 2016, Georgia completed its first utility scale wind project, the 20.7 MW Qartli wind power plant in the central part of the country, also with the financial support of the EBRD. (UNECE/REN21 2017).

Albania is the most developed market for solar water heating due to the government and UNDP/GEF support. In Armenia, solar water heating capacity continues to grow due to funding by the soft loans of the commercial banks of Armenia and Germany's KfW Development Bank (ibid).

In the heating and transport sector, the development of renewable energy technology remains even slower. The countries of the region have large biomass[28] resources that are only partially exploited. Belarus has the most developed bio-heat sector, with seven solid biomass-based and 16 biogas-based combined heat and power (CHP) plants,[29] feeding district heating networks. Belarus' example could be replicable in countries with functioning district heating networks, as these can be converted to be fuelled by solid biomass or biogas where local supply is available.

Moldova promotes renewable heating systems through the Moldova Energy and Biomass Project, funded by the EU. The programme supplies municipal institutions with biomass heating systems (burning mainly biomass briquettes and pellets from agricultural waste). Montenegro is implementing the Energy Wood project – which provides soft loans for heating systems fuelled by modern biomass, such as wood pellets or briquettes – with support from Luxembourg's Agency for Development Cooperation (UNECE/REN21 2017).

These latest developments, as well as existing policy and regulatory frameworks, are a good starting point. But overall the progress of countries in deploying renewable energy and energy efficiency technologies remains very slow, and the vast potential in the region remains unlocked.

4. Challenges and Barriers for Energy Transition

Although all the countries – with one exception – have policy and regulatory frameworks on renewable energy and partly on energy efficiency measures, significant barriers still hinder their accelerated uptake in the region. This section elaborates on the *political, financial, technical and social* challenges and barriers in the countries of the region.

4.1 Inherited Centralization of Energy Systems and Close Links between Politics and Business

One of the major characteristics of energy systems and energy supply infrastructure in the countries of the region is their inherited centralization with monopolies and large-scale energy generation facilities from the Soviet era. Especially in the countries that are heavily dependent on fossil fuels and nuclear energy resources, large energy providers either belong to the state or are directly supported by it and have little or no interest in changing the status quo.

Centralization of fossil fuel and nuclear energy industry also makes it much more prone to corruption than decentralized renewable energy. Corruption is widespread across the countries of the region, with Turkmenistan, Tajikistan, Uzbekistan and Russia scoring the highest and Georgia, Montenegro and Belarus[30] scoring the lowest

27. In Kazakhstan two utility-scale projects were realized, both with EBRD financial backing: the 50 MW Burnoye Solar-1 in the southern region of Zhambyl, and a 50 MW wind power park near the capital Astana (Nabiyeva, 2018).

28. Biomass refers to any material of biological origin, excluding fossil fuels or peat, which contains a chemical store of energy (originally received from the sun) and which is available for conversion to a wide range of energy carriers. These can take many forms, including liquid biofuels, biogas, biomethane, pyrolysis oil or solid biomass pellets (UNECE/REN21 2017).

29. CHP or cogeneration plants use the heat created as a by-product of electricity generation for district heating or for industrial processes, which increases the overall efficiency of the process.

30. Transparency International's Corruption Perception Index ranks 180 countries and territories by their perceived levels of public sector corruption according to experts and business people, on a scale of 0 to 100, where 0 is highly corrupt and 100 is very clean. In 2017, the countries of the region scored as follows: Turkmenistan (19), Tajikistan (21), Uzbekistan (22), Russia and Kyrgyzstan (29), Ukraine (30), Moldova (31), Kazakhstan (31), Azerbaijan (31), FYR Macedonia and Armenia (35), Albania and Bosnia and Herzegovina (38), Kosovo (39), Serbia (41), Belarus (44), Montenegro (46) and Georgia (56) (Transparency International 2017).

on corruption perceptions in 2017 (Transparency International 2017).

As a rule, a few established energy suppliers (gas, coal, oil and nuclear) and utilities dominate the market. Due to their close ties to the government, the established energy players make market entry for new players difficult and block competition. As a result, open electricity markets, unbundled energy generation and transmission ownership,[31] regulated third-party access[32] and sufficient competition on the supply and demand sides are often unknown in the countries of the region (IRENA 2017).

This historically centralized approach to energy systems also often causes top-down decision-making, lack of ownership and little interest and incentives in energy saving. Historically, heat meters and temperature regulators are missing in the residential sector and households pay their bills as a rule not for heat used, but based on the size of their apartment. The most common way to regulate temperature in winter is by opening the windows.

Furthermore, government authorities in many countries of the region are often publicly sceptical towards renewable energy. Russian President Vladimir Putin was famously quoted as saying that wind turbines make moles come out of the ground (Korsunskaya 2010). In 2014, Kazakhstan's President Nursultan Nazarbayev said, »I personally do not believe in alternative energy sources, such as wind and solar. Oil and gas is our main horse, and we should not be afraid that these are fossil fuels« (Sorbello 2014) just two years after announcing his plan for the country's transition to a green economy.

Some politicians present the maintenance and expansion of the local fossil fuel industry as the only way to guarantee energy security. For instance, in Kosovo, the government prefers the construction of a new lignite power plant as a result of a strong politically biased narrative, although renewables appear to be a more cost-efficient alternative even before considering external costs (cf. Germanwatch 2018). Maintaining the country's own lignite production was presented in the public debate as a contribution to political independence from Serbia.

Furthermore, the use of false narratives that renewable energy technologies are more expensive than local fossil fuel energy and are being imposed by the EU is not uncommon. For instance, in 2018, Serbian President Aleksandar Vučić was quoted as saying that he does not understand why the country needs to pay for »expensive« electricity from renewables in order to comply with EU regulations when it can produce the cheapest electricity in the EU at the Kostolac thermal power plant.[33]

4.2 Fossil Fuel Energy Subsidies and Low Energy Tariffs

High fossil fuel and nuclear energy subsidies are present throughout the region and their percentage in the region's GDP is one of the highest in the world, with individual shares ranging from less than 2 per cent in Armenia to over 60 per cent in Ukraine. Bosnia and Herzegovina, Serbia, Kyrgyzstan, Uzbekistan and Turkmenistan are also in the world's top ten (UNECE/REN21 2017).

Fossil fuel subsidies, artificially lowering fossil fuel prices, have multiple negative environmental, economic and social effects. In particular, they increase energy consumption and greenhouse gas emissions, strain government budgets, divert funding that could otherwise be spent on social priorities, such as health care or education and reduce the profitability of renewable energy sources (OECD 2013).

In many cases, low energy tariffs are agreed among the few energy suppliers and the government. These electricity and heat tariffs are often below their cost-recovery level. In comparison with 0.2 EUR per kWh in the European Union on average and 0.3 EUR per kWh in Germany, electricity prices for households range from 0.04 EUR in Ukraine, 0.07 EUR in Serbia, 0.09 EUR in Albania (Eurostat 2017) to 0.009 EUR per kWh in Kyrgyzstan (World Bank 2018a).

31. Unbundling is the separation of energy supply and generation from the operation of transmission networks to enable competition on the energy market.

32. Third-party access (TPA) gives a legal right to independent enterprises, operating in the energy sector, to access and use energy network facilities which are owned by other companies. TPA is essential for the entry of new market players.

33. This quote was translated by an interview partner from Serbia. The original quote in Serbian can be found here: https://www.b92.net/biz/vesti/srbija.php?yyyy=2018&mm=10&dd=11&nav_id=1454777.

Low energy tariffs significantly reduce the competitiveness of renewable energy and discourage investment in new technologies. For instance, the average electricity consumer price of 0.05 EUR per kWh in Kazakhstan means that a return on investment in solar PV energy takes 20 to 25 years, which is extremely long for local investors, who expect amortization within five years (Nabiyeva 2018).

Subsidies do not reduce the cost of energy, but move it onto the population in a different way, which may suit the political circumstances in the short term, but not in the long term. Someone still pays, but through taxes, forgone expenditure, lack of investment in energy infrastructure and quality of service (OECD 2018). As subsidies are largely untargeted and inequitable, they tend to benefit the higher income population that has a higher per capita consumption of energy, which inadvertently reinforces social inequalities (UNDP 2014b). Only a smaller percentage of such subsidies reach the poorest population, demonstrating the inefficiency of this mechanism.

On the other hand, energy tariff reforms and increases are a very sensitive topic for the population, especially for vulnerable social groups. The average percentage of household income spent on energy by the lowest income decile of the population in the region was approximately 14 per cent, about double the global average of 4–8 per cent, which makes them especially vulnerable to energy price hikes. Indeed, increases in energy tariffs threaten to intensify energy poverty in the region and therefore should be combined with targeted social assistance and compensation mechanisms for economically vulnerable social groups (UNDP 2014b).

Elimination of fossil fuel subsidies can release financial resources for governments that could be used for more targeted support to vulnerable groups, improving health care and supporting energy efficiency measures (OECD 2018).

4.3 Lack of Investment Security and High Cost of Capital

Renewable energy technologies have a different cost structure from fossil fuels and nuclear energy, as the former are capital intensive at the beginning, but have no costs on fuel later. The cost of capital of renewable energy investments directly reflects how investors perceive the risk. A range of contract-related risks, regulatory factors (stability of policy regime, time required to obtain permits and secure land and grid access) and market environment factors (interest rates, inflation, competition) can significantly influence the cost of capital for renewable energy (Agora Energiewende 2018d). Stable policy and reliable regulatory frameworks lower risks and translate into lower costs for project developers and lower rates of return needed to make an investment profitable (cf. Agora Energiewende 2018a).

Lack of investment security translates into country-specific premiums on the costs of renewable energy investments that are not related to technology risks or weather conditions. For instance, at current cost of capital levels, investments in renewable energy technologies in the Western Balkans cost up to twice as much as in Germany or France (Agora Energiewende 2018b).

Members of the Energy Community are advancing significantly faster in terms of policy and regulatory support for renewable energy technologies, due to their obligations under EU energy regulations. But even in those countries a long-term vision is often lacking, as the countries have been pursuing only the EU 2020 renewable energy and energy efficiency targets and the work on planning the 2030 targets started just recently.

In many countries of the region, policy frameworks and the design of support schemes are often subject to change, which leaves considerable room for market uncertainty. Drastic and partly retroactive legal changes to renewable energy support schemes in Bulgaria and Romania[34] in recent years had a spillover uncertainty effect from these countries to the entire South East Europe region (IRENA 2017).

In most of the countries in the region, there is also a higher risk perception because of numerous barriers at the regulatory level and complex administrative procedures and regulations on permits and licensing, leading to a long project development period and additional transaction costs for businesses. The design and ap-

34. For more information on retroactive changes in Bulgaria and Romania see https://www.diw.de/documents/publikationen/73/diw_01.c.580373.de/dp1726.pdf.

proval process of Power Purchase Agreements[35] (PPAs) are also often problematic. A PPA developed in 2016 by Serbia with the support of the EBRD was quoted by experts as a best practice, which addresses the bankability issues.

On top of these policy and market uncertainties, many countries have started shifting from feed-in tariff systems to tendering. For instance, in 2016 Kazakhstan announced a planned switch from feed-in tariffs to the auction system starting from 2018, but information on auctioning procedures was not available for almost eighteen months, leading to uncertainty and limbo for numerous investment projects (Nabiyeva 2018).

4.4 Limited Access to Finance

The instability of legislation on renewable energy and high risk perception also lead to difficult and expensive access to capital in the countries of the region. For instance, capital costs are markedly higher in the non-EU countries of South East Europe than in EU countries. An extreme example is Ukraine, where bank interest rates were as high as 30 per cent (IRENA 2017).

As a result, almost all recent utility scale renewable energy projects – among others, solar and wind parks in Kazakhstan and wind parks in Georgia and Serbia, were possible only with the financial backing and guarantees of the EBRD. As for off-grid renewable energy installations, citizen investors, farmers and communities also as a rule have limited access to affordable capital.

The availability of sizable public and private funding is also a significant barrier for the deployment of energy efficiency projects in most countries of Eastern Europe, South Caucasus and Central Asia. In South East Europe funding from international donors is more readily available, but the absorption capacity at the local level is often weak (UNECE/REN21 2017).

Municipalities are often more interested in local energy efficiency measures, but as a rule have extremely limited or no budget money for retrofitting buildings and introducing energy efficiency measures. Several countries in the region have started to address this issue through specialized funds with the support of international donors.[36]

4.5 Lack of Technical Capacity and Know-how

As a result of the abovementioned challenges and very few successful renewable energy and energy efficiency projects, technical know-how and expertise in the region are still very limited. Local specialists and skilled labour are lacking, as well as technology providers in the renewable energy and energy efficiency sector.

Dedicated agencies and funds coordinating renewable energy and energy efficiency policies and promoting projects from the government side are still rare. Scientific and research centres for energy, while present in all the countries, remain under the academies of sciences or as part of the technical university frameworks, with very little or no funding for technology research and development.

Graduate and postgraduate programmes in sustainable energy management and environmental engineering are rare in the region. This discourages the growth of a new generation of scientists and researchers, and further impedes the scientific and technological research development in the region (cf. IEA 2015).

Another key technical barrier is lack of comprehensive and inclusive data. For instance, tracking performance indicators for energy efficiency, such as KWh per floor area, remains challenging and individual metering in district heating is not available systematically at the end-user level (UNECE/REN21 2017).

4.6 Lack of Public Awareness and Low Public Engagement

Active public engagement and broad societal debates were crucial factors in changing the political mind-set and fostering the development of renewable energy in

35. A power purchase agreement is an important contract that governs the sale and purchase of power, defining the bankability of the project and providing long-term security for investors and project developers.

36. For instance, several revolving funds were introduced in Ukraine with NGO support at the municipality level. At the country level, a Revolving Fund for Energy Efficiency was created in Bosnia and Herzegovina in 2016 with contributions from the government of Sweden and UNDP through the Green Economic Development Project. The Ukrainian State Energy Efficiency Fund, which was set up with the support of the German Government and the European Commission, is about to become operational. Moldova's Energy Efficiency Fund, supported by the EU Delegation in Moldova, finances small energy efficiency projects by public or private entities (UNECE/REN21 2017).

the countries embarking on an energy transition. They ensure the building of the necessary basic social trust in the feasibility, reliability and economic benefits of renewable energy and energy saving measures (cf. Hirsch 2015).

Across the region, public awareness of the socio-economic benefits and feasibility of renewable energy and energy efficiency technologies remains quite low. In many countries investigative and media reports on the interrelation between fossil fuel use and air pollution and health issues are still rare. Public discussions of world trends on renewable energy and saving, the carbon bubble,[37] whose bursting would lead to trillions of stranded assets, and a new financial crisis, as well as divestment movement from fossil fuels are not widespread.

Furthermore, in many countries of South East, Eastern Europe, South Caucasus and Central Asia – with some exceptions – the public is historically isolated and disengaged from political processes. The number of non-governmental organizations working on sustainable energy, environmental and health issues is, as a rule, limited. In many cases local NGOs and political activists lack funds and/or know-how for organizing broad public awareness campaigns and are subject to restrictions on their work or pressure by the government.[38]

Another significant barrier is lack of ownership, experience and interest in engaging in political activism and social dialogue. Citizen energy or energy cooperatives are almost non-existent in the region. Still, in some countries positive examples can be found of how such processes can bring about behavioural changes in society.[39]

5. Opportunities and Possible Drivers of Energy Transition

5.1 Energy Security and Diversification

Secure and sufficient energy supply is an important driver for renewable energy and energy efficiency, no matter whether a country is a net energy exporter or importer. The economies that are heavily dependent on revenues from local fossil fuel energy production could increase their resilience to external shocks, such as volatile oil prices, by diversifying their energy supply.

The majority of the countries of the region are net energy (gas or oil) importers with heavy reliance on a single source at country level. For instance, in Armenia, Belarus and Georgia net energy imports account for over 60 per cent of total energy use and in Moldova 90 per cent. The introduction of energy efficiency measures and deployment of local renewable energy sources can help them to become less vulnerable and politically dependent on energy imports from Russia or other countries (UNECE/REN21 2017).

Power outages are an issue in some of the countries and are exacerbated on a seasonal basis due to hydropower fluctuations and the effects of an ageing energy infrastructure. In countries with high shares of hydropower generation, for instance Albania, Georgia, Tajikistan and Kyrgyzstan, deployment of non-hydro renewable energy sources could help to tackle seasonal variations in hydropower (ibid).

In Russia and the countries in the South Caucasus and Central Asia there is an especially strong economic case for solar water heating and decentralized off-grid renewable power generation in remote regions and rural areas, which have no access to central electricity and heating. It would also help to reduce the levels of illegal deforestation for firewood.

5.2 Economic Growth and Jobs

Numerous studies show that investment in climate action measures and deployment of renewable energy and energy efficiency technologies boost economic growth, create new employment opportunities and enhance welfare. They encourage technical innovation, improve the investment climate and stimulate domestic business (cf. OECD 2017; IRENA 2016). Worldwide, 10.3 million people are already employed in the renewable energy sector (IRENA 2017).

The resulting economic activity and job creation can help to avoid depopulation and decline in rural areas, which lead to labour migration. In 2013, about 37 million emi-

37. For more information on the carbon bubble see Harvey 2018.

38. In Russia, the 2012 law requires independent groups to register as »foreign agents« if they receive any foreign funding and engage in broadly defined »political activity«. As of June 2018, 76 groups, including NGOs, working on environmental and energy issues, were labeled »foreign agents« by Russia's Justice Ministry (Human Rights Watch 2018).

39. For more information, see Section 6 on best practices.

grants came from the countries of the region,[40] accounting for 16 per cent of all international migrants in the world and nearly 10 per cent of the total population in the countries of origin. The main reason for their migration was a search for employment (IOM 2015).

The growth of employment could also help to reduce the brain drain of young people from the region. For instance, in the Western Balkans nearly 25 per cent of young people were inactive – not in employment, education or training – in 2013, with figures reaching 39 per cent in Montenegro and 54 per cent in Bosnia and Herzegovina (World Bank 2015).

Depending on the level of development of the renewable energy sector, jobs can be created along the entire value chain, including project planning, manufacturing, installation, grid connection, operation and maintenance and decommissioning. Especially installation as well as operation and maintenance are typically carried out by local engineering, procurement and construction companies and can create domestic jobs and value. Further opportunities for domestic value creation exist in support processes, such as policy-making, financial services, education, research and development and consulting (IRENA 2014).

5.3 Health and Environment

According to World Health Organization (WHO) statistics, air pollution causes seven million premature deaths a year worldwide, largely as a result of increased mortality from strokes, heart disease, lung cancer and acute respiratory infections (WHO 2018). In Europe[41] alone, over 420,000 premature deaths are caused by long-term exposure to air pollution (EEA 2018).

Coal mining and power generation are among the most dangerous sources of air pollution, causing acute and chronic health effects. A recent HEAL report showed that coal power plants in five Western Balkan countries are among the most polluting in Europe, causing 7,181 premature deaths per year, which translates into costs of between 2.9 billion and 8.5 billion EUR per year in damages to the health of European citizens. Depending on weather and wind conditions, air pollutants can travel more than 1,000 kilometres and cause damage to health beyond national borders, in neighbouring EU countries and beyond (Matkovic Puljic 2016).

Furthermore, mining and burning of coal and other fossil fuels leads to other dangerous environmental effects, including degradation and loss of groundwater and rivers, forest destruction and degradation of vital ecosystems. The Chernobyl and Fukushima disasters have proved that nuclear energy is extremely dangerous and the disposal of highly radioactive nuclear waste remains an unresolved problem internationally.

Deployment of renewable energy and energy efficiency measures could help to dramatically improve air quality and reduce the number of health issues and deaths resulting from air pollution. It would also provide a sustainable and environment-friendly alternative to fossil fuel and nuclear energy.

Most of the coal-fired power plants in the countries in question are aging, dating back to the Soviet era. Thus utilities and governments in the Western Balkan countries will have to decide within the next decade whether to modernise or replace roughly 50 per cent of the currently installed coal and lignite generation capacity (Agora Energiewende 2018). This opens up a window of opportunity for political decisions in favour of investments in green energy.

Currently, environmental and health concerns were reported to be a minor driver of renewable energy and energy efficiency deployment in the region. But compliance with obligations under the Energy Community or the EU accession process and to a lesser degree commitments under the Paris Agreement are increasingly forcing some countries in the region to take steps towards adopting sustainable energy policies and climate action plans. Due to the involvement of international and civil society projects, raising awareness about the environmental and health impacts of fossil fuel and nuclear energy generation, these issues are increasingly covered by the local media.

5.4 Democratization and Peace-building

Deployment of decentralized renewable energy is a crucial factor fostering overall democratization and decen-

40. The IOM study covered all the countries examined in this publication, as well as Israel and Turkey (IOM 2015).

41. The EEA report covered the EEA member countries and the Western Balkans (EEA 2018).

tralization processes in the countries. Investments and support for renewable energy projects by energy cooperatives, communities and citizens can help significantly to reduce oligopolistic control of large conventional power plants and levels of corruption. It also encourages a stronger sense of ownership and participation among citizens, as well as social acceptance of the development of renewable energy infrastructure.

In Germany, for instance, citizen energy was a decisive driver of the country's Energiewende, with almost half of total installed renewable energy capacity owned by private individuals and farmers, and much of the expansion in recent years driven by citizens' onshore and offshore wind projects (Clean Energy Wire 2018).

Last but not least, renewable energy deployment can foster regional cooperation by means of the expansion of interconnection capacities to neighbouring countries and cross-country trade and help to end conflicts over limited and unevenly distributed fossil fuel energy and water resources among countries and regions.

6. Best Practices

Although the overall rate of deployment of renewable energy technology and energy efficiency measures remains slow in South East and Eastern Europe, South Caucasus and Central Asia, some best practices can already be found in the region. In this section three successful projects and initiatives are presented that could be valuable for similar undertakings. There was no bias or preferences regarding the choice of countries or the projects.

The countries and projects were chosen based on the following criteria:

1) high potential for replication in other countries of the region, due to comparable political, social and economic starting points;

2) representation of various mechanisms (financial, political and education support);

3) representation of various target groups (NGOs, businesses, communities and households);

4) representation of various technologies (renewable energy and energy efficiency);

5) no or limited need for high donor funding.

6.1 Energy Cooperatives: Enabling Citizen Energy and Saving Forests in Georgia

As a net oil and gas importer, Georgia relies heavily on imports of fossil fuels to meet its energy needs. Domestic energy production covers less than one-third of the country's primary energy demand. In 2016, natural gas accounted for 40 per cent of total primary energy supply, oil 30 per cent, hydropower 17 per cent, biofuels 8 per cent and coal 5 per cent (EU4Energy 2017b).

Due to abundant water resources, (controversial) hydropower dominates electricity generation. In 2016, hydropower generated 81 per cent of electricity (small hydropower accounted for 4 per cent). The seasonal shortage in winter is compensated by thermal power plants and natural gas imports from Azerbaijan and Russia.

Despite their huge potential, renewable energy sources, except for hydropower, remain untapped. According to UNDP estimates, solar PV alone could generate 97 000 MW (UNDP 2014), which exceeded by nine times the total required power generating capacity in 2016. The first wind power plant with a total installed capacity of 20.7 MW was built with EBRD financial support in 2016.

Georgia has neither a special law and targets on renewables nor energy efficiency legislation. Provisions on some aspects of renewable energy are set out in prima-

Project Snapshot	
Country	Georgia
Initiative	Gender-sensitive energy cooperatives
Technology	Solar water heaters
Social-economic benefits	Replacing inefficient firewood burning with solar water heaters, prevention of deforestation, tackling energy poverty, improving air quality and emission reduction
More information	http://www.wecf.ge/new/24/

ry and secondary legislation. But a number of barriers and a lack of supportive mechanisms and policies hinder the development of small-scale and off-grid renewable energy technologies. In July 2017, Georgia joined the Energy Community and is expected to start meeting its obligations under the Treaty.

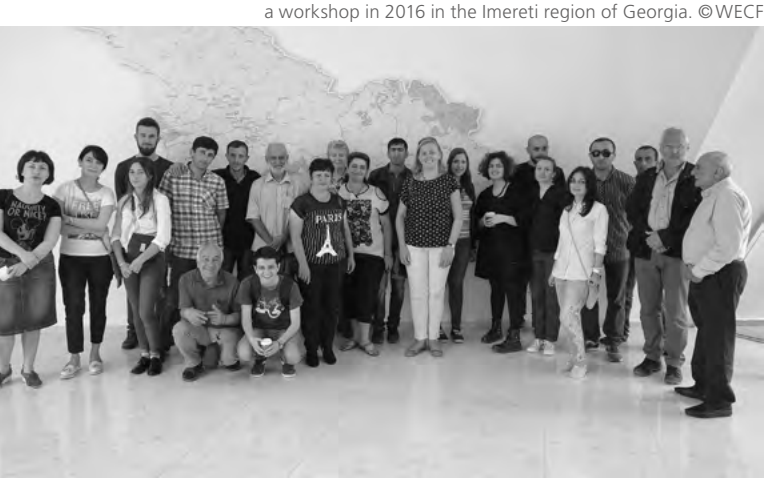
Solar Energy as an Alternative to Firewood Burning

About half of the Georgian population of four million people use firewood for heating and cooking. Especially in the countryside people rely on inefficient wood-burning stoves and buy expensive wood. The official firewood allocated by the Georgian National Forest Agency covers only about 25 per cent of demand, which contributes to illegal logging and gradual deforestation (CENN 2016).

To help solve this problem, in 2010 an international NGO Women in Europe for a Common Future (WECF) started an EU-funded project, introducing solar water heaters to replace wood stoves. During that period, WECF installed some 500 solar water heaters across Georgia and trained people how to construct them.

›The trained people started constructing solar water heaters in their backyard. Later four workshops evolved‹, Anna Samwel, head of the WECF office in Georgia says. ›As the project funding was [at an end], its participants were very motivated and wanted to continue with construction.‹ In 2016, with WECF training and the support of several Georgian NGOs, four cooperatives with a total of 50 members were established.

Representatives of WECF and four Georgian energy cooperatives at a workshop in 2016 in the Imereti region of Georgia. © WECF



The energy cooperatives specialize in consulting, production, installation, service and maintenance of solar water heaters. Currently, they are the only domestic manufacturers of solar water heaters in Georgia and offer them on favourable conditions. ›Energy cooperatives offer a five-year guarantee for their solar water heaters, the longest in comparison to imported products. They also have an agreement with a local bank, offering 0 per cent credit for clients for a maximum of two years‹, Anna Samwel says.

To better coordinate their work and to improve sales, cooperatives established an umbrella coop, which supports its members with product development, marketing and training. Membership of the umbrella cooperative was opened up to international investors and includes WECF, a European cooperative and a private German company.

Donor Funding and Coordination Needed

Over recent years, about 850 solar water heaters have been installed in Georgia, saving an estimated three cubic meters of wood per solar water heater yearly and helping to reduce CO_2 emissions. With an average three to six years' return on investment, they also lead to significant financial savings for households and contribute to solving energy poverty in Georgia. A majority of rural households in Georgia are classified as ›energy poor‹ as they spend around 30 per cent of their income on fuel (WECF 2015).

Although solar water heaters have proved to be cost-effective technology and could be deployed in large quantities, this market remains undeveloped in Georgia. ›Unfortunately, there is still low awareness about the benefits of solar water heating among the local population and policy-makers. Also, there is a lack of willingness among policy-makers and donors to support small scale projects‹, Anna Samwel says. By the end of 2018, WECF plans to train 50 women as solar ambassadors to promote the use of solar water heaters and to obtain an additional source of earnings.

Building upon the successes of its pilot project, in 2015 WECF helped to develop the first gender-sensitive Nationally Appropriate Mitigation Action (NAMA)[42] world-

42. NAMAs are actions, prepared under the umbrella of a national governmental initiative in developing countries, aimed at reducing greenhouse gas emissions within one or across several economic sectors.

wide for Georgia. The proposal includes measures for scaling up the creation of gender-sensitive energy cooperatives, training in the installation and monitoring of solar water heaters and fuel efficient stoves and creation of a financial mechanism for low-income households across Georgia (WECF 2015). But due to high competition from other countries, the Georgian proposal did not get approval for funding of the international NAMA facility, established by the UNFCCC, Anna Samwel says.

›International donors need to allocate more money for mitigation action and need to better coordinate their work among each other as well as with the Georgian Ministry of Environmental Protection and Agriculture and the Ministry of the Economy‹, Anna Samwel says. Currently, there are two more programmes being launched by the EU together with UNDP and one by GIZ, on sustainable rural energy, aimed at reducing the use of firewood in Georgia, but better coordination and lesson sharing is needed, according to Samwel.

The beneficiary Guranabidze family from Ivandidi village in the Imereti region of Georgia with their installed solar water heater in the background. © WECF

Enabling Citizen Energy

Whereas in Germany, Denmark and Belgium, energy cooperatives have played a key role in the deployment of renewable energy technologies, they are nearly non-existent in the countries of the EU Eastern Partnership and Western Balkans, a 2017 study[43] by WECF and Zelena Energetska Zadruga showed. According to the study, the main barriers to establishing energy cooperatives in these countries are the lack of appropriate support framework, financing, knowledge and successful pilots. Furthermore, in the post-Soviet countries, cooperatives often have an ›old-fashioned‹ and ›socialist‹ image and people have little experience and trust in citizens' cooperative structures.

The study also shows that under the existing legal framework and with the strong support of non-governmental organizations, energy cooperatives could be established in all the analysed countries and some formal or informal citizen-led initiatives already exist. Apart from Georgia, energy cooperative pilots can be found in Croatia and Ukraine. The Armenian NGO Foundation to Save Energy is about to launch a community solar PV project. In 2010, a cooperative of local craftsmen and engineers was established in Tajikistan with the financial support of GIZ, which develops and manufactures locally energy efficient products.

Experience of energy cooperatives in the EU countries shows that they have a positive impact on citizens' integration in sustainable economic processes, contribute to social awareness and acceptance of renewable energy technology and strengthen the regional economy. They also leverage citizen participation and transparency, as well as the overall decentralization and democratization process.

6.2 Greencubator: Fostering Green Entrepreneurship and Innovation in Ukraine

Two years after the Euromaidan protests in 2014, Ukraine launched a range of promising reforms in the energy sector, leveraged by the financial assistance of international financial institutions. Energy subsidies and gas con-

43. The analysis covered Armenia, Belarus, Bosnia-Herzegovina, Croatia, Georgia, Moldova, Serbia and Ukraine.

Project Snapshot	
Country	Ukraine
Initiative	NGO, connecting businesses, bloggers and interested people and providing access to capital for green innovations
Technology	Renewable energy, energy efficiency, circular economy
Social-economic benefits	›Ecosystem‹, meeting points, knowledge, access to capital
More information	http://greencubator.info/?lang=en

sumption were cut significantly, putting an end to the long-standing dependence on direct Russian gas imports (Nabiyeva 2016).

But major challenges to energy security in Ukraine remain, as the energy supply is still dominated by fossil fuels and nuclear energy. The occupation of the Donbass region, the former heartland of coal, has resulted in an abrupt decline of domestic coal mining and increased coal imports. Some 70 per cent of nuclear fuel is imported from Russia (Savitsky 2018).

A big part of nuclear and coal infrastructure, accounting for 50 per cent and 38 per cent, respectively, of electricity generation (EU4Energy 2017d), dates back to the 1960s and will need to be decommissioned in the coming years. This provides a chance to phase out fossil fuel and nuclear power generation and scale up renewable energy. The energy intensity of Ukraine's economy is about three times higher than the EU average. In the residential sector, the metering level of water and gas remains extremely low, leading to inefficient consumption (Nabiyeva 2016).

View on solar panels and the Kiev skyline at the Tesla Camp 2018. © Greencubator

According to IRENA, Ukraine has a large wind and solar potential for power generation, which is still untapped (IRENA 2017). The share of renewable energy sources – excluding large hydropower – accounted for 1.4 per cent of the country's electricity mix in 2012 (UNDP 2014a). The target of 11 per cent by 2020, set by the Ukrainian government, looks a long way off. In 2018, the Ukrainian government started revising the existing feed-in tariff (green tariff) system for renewable energy sources available until 2030 and started to consider the introduction of auctions (Energy Community 2018).

›Connecting Energy Talents‹

Following the 2008 financial crisis, Roman Zinchenko, now head of the Ukrainian NGO Greencubator, lost his job in finance. In his spare time Zinchenko started renovating a country house and learned about the inefficiency of the Ukrainian energy sector first hand. This is when he became excited about the idea of developing green solutions in the country. ›Back then, green energy was regarded as the equivalent of flights into outer space‹, Zinchenko says. ›In order to change this situation, we needed to introduce cultural changes, therefore we decided to reach out to students and people interested in the topic.‹

Together with his brother Andrij and with the support of USAID grant funding, Roman Zinchenko organized a first energy camp, an open-air countryside event, fully powered by renewable energy technologies. The event became a meeting point for green energy innovators and enthusiasts, students, investors and journalists, Zinchenko says.

Building on this success, the Zinchenko brothers founded the NGO Greencubator, a platform for ›connecting energy talents‹. After 15 events across the country, in 2013 Greencubator relaunched an extended format of an open-air Tesla Camp. The annual event now includes a hackathon, a competition for innovative start-up ideas and their implementation.

Driving Green Innovation and Entrepreneurship

In 2016, Greencubator started managing the Climate Innovation Voucher Programme,[44] implemented by the EBRD and financed by the EU Neighbourhood Investment Facility. ›This is the biggest programme, enabling access to capital for Ukrainian companies and developers working on climate and energy innovations‹, Roman Zinchenko says. The programme, with funding of 1 million euros for 2017–2018, is set to provide 50 Ukrainian companies with an opportunity to receive grant funding, ranging from 20,000 to 50,000 euros, for projects on reducing energy inefficiency and greenhouse gas emissions.

›We were pleasantly surprised that the number of applications exceeded our expectations. Since its start, the Programme has financed about 20 companies, offering a range of solutions, including renewable energy, off-grid solutions, sustainable mobility, sustainable agriculture, smart home and resource efficiency‹, Roman Zinchenko says. Greencubator helps the winning companies to scale up their ideas and find new capital and knowledge.

The winners of the Programme include a start-up Ecoisme, offering a smart home energy monitoring device, which helps to reduce up to 25 per cent of electricity consumption; a Kiev-based UkrTsentr-Grup company, which developed a carbon-negative organic insulation material; and a Kiev-based company Electrocars, which has developed a web-based map of electro charging stations across Ukraine.

The winners of the Ukrainian final of Climate Launchpad 2018 at the Tesla Camp in Kiev. © Greencubator

44. Later, the EBRD launched a similar innovation voucher scheme in Serbia.

Energy Transition Boosting Economic Growth

As a next step, Zinchenko wants his NGO to become a hub for climate and energy innovations in Eastern and Central Europe. ›We are currently building our new office as a full-time education provider and an innovation hub, hosting green companies, lecturers and technology companies, created through our support programmes‹, Zinchenko says.

›I believe supporting green entrepreneurship is a major opportunity for boosting economic growth and jobs and revitalizing a number of cities across Ukraine by transforming consumption and industries across all sectors, from metallurgy to construction and aerospace‹ Zinchenko adds.

A number of recent studies have shown that the transition of the energy sector towards renewable energy and energy efficiency would enable Ukraine to build a strong economy and solve various socio-economic and environmental problems.[45] Internationally, numerous reports have shown a positive correlation between investments in green economy and economic growth. Among others, the 2017 OECD report 'Investing in climate, investing in growth' found that the transformation of economies towards climate-friendly, low- or zero-emission and inclusive development pathways does not harm but rather provides a long-term boost to economic growth (OECD 2017).

6.3 KyrSEFF: Financial Mechanism for Energy Efficiency Measures in Kyrgyzstan

Almost 90 per cent of Kyrgyzstan territory is dominated by mountains. More than 60 per cent of the Kyrgyz population lives in piedmont or mountainous areas, which makes supplying them with conventional energy sources difficult and expensive. Therefore decentralized power generation from renewable energy sources would be particularly beneficial in distant rural households, crop and livestock farms and tourist resorts.

But the potential of renewable energy in Kyrgyzstan remains largely untapped. Including large hydropower, the share of renewables in electricity generation stands at 87 per cent (EU4Energy 2017c). Otherwise, its share,

45. See, for example, the studies Child (2017) and Heinrich-Böll-Stiftung (2017).

Project Snapshot	
Country	Kyrgyzstan
Initiative	EBRD financial facility
Technology	Energy efficiency, water and waste water management
Social-economic benefits	Energy and water saving, CO_2 emission reduction; development of the energy efficiency market
More information	http://www.kyrseff.kg/?lang=en

provided entirely by small hydropower, is only 1.1 per cent (UNDP 2014). The country has adopted a law on renewable energy with a focus on small hydropower plants, which provides a number of incentives. In 2012, primary and secondary legislation introduced mandatory energy efficiency requirements, energy performance certification of buildings and regular inspection of heating systems (EBRD 2012).

Kyrgyzstan's energy sector is characterized by aging energy infrastructure and high losses. Due to lack of investment, about 45 per cent of available generation capacity is beyond its useful service life, with network losses often exceeding 25 per cent. Most district heating assets were commissioned up to 50 years ago and are in poor condition (World Bank 2018a). Due to deteriorating heat supply, some 35 per cent of urban households use electricity as a major or additional heating source, which forces up residential power consumption in winter (World Bank 2015). Another 40 per cent rely on inefficient and highly polluting coal-fired stoves or boilers. As a result, Kyrgyzstan is one of the worst-affected countries in the region by diseases resulting from indoor air pollution (World Bank 2017).

Eco-resourt »Ak-Tilek« in the Chui region of Kyrgyzstan, which installed a wastewater treatment facility with KyrSEFF support. © KyrSEFF/Nurila Otunchieva

Putting Energy Efficiency on the Agenda

At USD 0.01 per kWh, electricity tariffs for Kyrgyz households are some of the lowest in the world[46] and are well below cost-recovery levels. Previous efforts to reform energy tariffs have failed over concerns about public protests (World Bank 2018a). Although poverty rates have been decreasing in recent years, 25 per cent of the Kyrgyz population were living below the national poverty lines in 2016 (World Bank 2018b).

›In the beginning our main aim was putting energy saving on the agenda. We focused on showing its benefits to the population and proving that it is economically profitable, despite the fact that electricity tariffs are cheap‹, Nurzat Abdyrasulova, country manager of the Kyrgyz Sustainable Energy Financing Facility (KyrSEFF) says.

In 2013, the EBRD[47] launched KyrSEFF, a USD 20 million credit line for projects supporting energy efficiency improvements in households and businesses. As part of the programme, the EU Central Asia Investment Facility provided free technical assistance to applicants, as well as grants to businesses and private borrowers upon successful project completion (EBRD 2013).

Private households could 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 supported the purchase of new production machinery and improvements in production processes and facilities. Following its successful implementation, in 2016 the EBRD launched a second phase of the facility (until 2020) with a credit line of USD 35 million, extending it to water management and waste water technologies (EBRD 2016).

46. Compare 0.009 EUR per kWh (0.01 USD per kWh) in Kyrgyzstan with 0.2 EUR per kWh in the EU on average, 0.3 EUR per kWh in Germany, 0.04 EUR in Ukraine, 0.07 EUR in Serbia, 0.09 EUR in Albania (Eurostat 2017).

47. According to the EBRD, Green Economy Financing Facilities with different components were or are still functioning in Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, FYR Macedonia, Georgia, Kazakhstan,* Kyrgyzstan, Russia,* Serbia, Tajikistan and Ukraine (EBRD 2018).

Raising Awareness and Stimulating the Market

KyrSEFF projects contribute to energy saving of up to 60 per cent in private households and up to 50 per cent in businesses, Nurzat Abdyrasulova says. According to the project reports, since its start in 2013, KyrSEFF has supported over 1,500 energy-saving projects in the housing sector and 112 in the business sector. These projects have contributed to saving more than 133,500 MWh of energy annually and have reduced carbon emissions by 42,200 tonnes per year (KyrSEFF 2018).

One of the key achievements of the KyrSEFF programme in recent years has been raising awareness about the importance of energy efficiency among the population. ›During the first years of the programme, KyrSEFF ran a large-scale information campaign with monthly radio and television appearances, as well as workshops and meetings with farmers and other stakeholders in the countryside‹, Nurzat Abdyrasulova says.

›Today energy saving has become a trendy topic. Previously, when planning to build a new house, the most important factor people considered was resilience to earthquakes. Now they always ask about energy efficiency standards and understand their benefit‹, Nurzat Abdyrasulova says. KyrSEFF regularly organizes training and consultations with local authorities, partner banks and local service companies.

The programme has additionally contributed to a 30 per cent growth of the energy efficiency technology market in Kyrgyzstan, according to Nurzat Abdyrasulova. ›Each year KyrSEFF makes a market overview and updates its list of eligible energy efficient equipment and installers. We have very high standards on materials and technologies and therefore supply companies are motivated to bring out new higher quality products.‹

Children in the kindergarten »Mamalak« in Jalal-Abad city of Kyrgyzstan. KyrSEFF supported insulation and heating improvements in the kindergarten building.
© KyrSEFF / Robert Mambetkaziev

Affordable Loans and Grants for Energy Efficiency

Given the relatively high instalment costs for renewable energy and energy efficient technologies and the longer payback periods, financial de-risking through zero- and low-interest loans and loan guarantees from development banks, as well as direct financial incentives, such as grants, are key to attracting investment in this sector in the region of Western Balkans, Eastern Europe, Central Asia and South Caucasus, according to the 2014 UNDP study.

But a big challenge for such facilities is often an immature market, with recipients unfamiliar with the benefits of energy efficiency and poorly developed marketing of the available financial products (UNDP 2014b).

An additional barrier is the relatively high annual interest rates of local partner banks of the financial facility, especially for socially vulnerable groups. In Kyrgyzstan, interest rates of the KyrSEFF partner banks have varied from 18 per cent in 2013 to over 20 per cent in 2018. Partly because of that, the majority of projects were implemented in the economically more affluent northern Chui oblast and Bishkek city.

Therefore, depending on the social-economic situation, it is important for international development banks and other financial institutions to introduce higher additional grant funding or hedging guarantees to help more projects on renewable energy and energy efficiency to take off.

7. Recommendations

This section summarizes the recommendations both to stakeholders in the countries of South East and Eastern Europe, South Caucasus and Central Asia, as well as stakeholders in Germany, the European Union and international organizations working on energy issues in the countries of the region.

Currently, the EU, with its associated programmes, is the largest and most important driver and supporter of the energy transition reforms and processes in these countries. It should use its leverage, vast experience and know-how to help the countries of the region to reap the social-economic benefits of sustainable energy development and help to overcome significant barriers at the policy, regulatory, financial and social levels.

7.1 Know-how Transfer and Capacity-building

A stable, clear and reliable policy and regulatory environment is critical factor, giving confidence to investors and fostering the deployment of renewable energy technology and energy efficiency measures. Lower investment risks and less regulatory and administrative barriers translate into lower costs for project developers and a shorter period of return on investment.

A key strategic area for cooperation with the countries of the region should therefore be the identification of barriers and risks, as well as knowledge transfer on favourable regulatory frameworks (laws, norms, regulations and so on) and policy and financial incentive schemes with simple administrative procedures, which would accelerate the take-up of renewable energy and energy efficiency technologies.

Such a transfer should include bilateral and multilateral consultations with governments and MPs, visits and exchange programmes. Consultations, policy advice and cooperation on strengthening the rule of law and improving the investment climate and security would also be important.

As all countries need to develop their low- or zero-carbon strategies in line with their commitments under the Paris Agreement, comprehensive support from the EU and German experts and structured discussion of the best technical and social-economic options for low-carbon development and just energy transition could be crucial. Knowledge transfer and discussions of the dramatic impact of the carbon bubble and the coming fossil-fuel demand peak[48] on their economies should also be on the agenda.

48. Some experts forecast that the peak in fossil fuel energy demand will come in the early 2020s, with a dramatic impact on financial markets and economies worldwide. See, for instance, Carbon Tracker 2018.

Furthermore, to advance their energy transitions, the countries of the region need to develop technical renewable-energy integration planning and operational capacity. At present the region's distribution system operators and transmission systems operators have limited or no expertise on how to manage and integrate electricity from variable renewable energy sources. Also, adequate technical and engineering skills can help to develop and establish a home market for renewable energy equipment and for exporting knowledge (cf. IRENA 2017).

Cooperation and capacity-building with regard to energy efficiency management systems, data collection, certification, standards and licensing in public buildings, as well as expert support in the establishment of agencies to deal with energy efficiency could be also beneficial. Targeted technical capacity-building with regard to renewable energy and energy efficiency could help to overcome technical and social barriers to their deployment in the region.

7.2 Increased Financial Support and Cooperation

The high cost of capital and lack of affordable funding were identified as a significant barrier hampering investments in sustainable energy projects. Cooperation on introducing de-risking mechanisms and cost-reduction facilities should therefore be developed. Such a mechanism for the countries of South East Europe – the European Renewable Energy Cost Reduction Facility (RES-CRF), which aims to lower the financing costs for renewable energy – is currently under discussion (Agora Energiewende 2018a).

Several institutions could play a key role in de-risking RES investments, including the European Investment Bank, the EBRD and the Western Balkan Investment Framework (for Western Balkan countries). Bilateral arrangements and cooperation could also be considered between the German Development Bank KfW and the respective countries.

Credit lines and investment facilities have generally proved to be helpful. But, due to perceived high investment risk and little experience of local banks with renewable energy and energy efficiency technologies, high interest rates exclude socially more vulnerable groups of

the population from access to finance. Therefore financing mechanisms and guarantee schemes with simple administrative procedures for households and small and medium-sized businesses, reducing interest rates or with an additional high grant element, should be considered. In less affluent countries, such as in Central Asia and South Caucasus, the focus should be on introducing micro-loan schemes with low or zero interest rates for farmers and households for installing energy efficiency measures and off-grid renewable energy.

Several experts have highlighted the importance of dedicated national environmental and energy efficiency funds for implementing energy efficiency and renewable energy projects in the public sector. This model has been implemented successfully in several countries in Central and Eastern Europe and adopted in Croatia and Bosnia and Herzegovina with the support of international funding. In 2018, the Ukrainian State Energy Efficiency Fund was set up with the aim of providing grants to homeowners' associations for energy-efficiency renovations in multi-family buildings. Co-funding was provided by the EU, Germany and the International Finance Corporation. Models of energy efficiency funds, which would generate enough savings to make them self-sustainable in future, should be considered in the first place. Regional exchange of best practices and experience would be very helpful to this end.

7.3 Fostering Regional Cooperation

Regional cooperation and power system integration are a low-cost and effective way to strengthen security of electricity supply. This covers crisis situations, such as extreme weather conditions, but collaboration also has to be embedded in a broader understanding of options for and benefits of cross-border power system cooperation and integration (Agora Energiewende 2018a).

Regional power interconnection can significantly lower the costs and make the systems more reliable during peak load periods. Cooperation programmes with the countries of the region should therefore have a regional element. In many cases, the basis for regional power interconnections and trade already exists[49] and can be expanded to support energy transitions in the region.

Programmes to strengthen institutional and technical capacity on the regional level could help to foster such cooperation. One such initiative, the Open Regional Fund for South-East Europe – Energy Efficiency,[50] funded by GIZ, could be used as a best practice. The initiative supports exchange and capacity-building among MPs and civil society, as well as direct cooperation and mentoring for cities and municipalities by partner German cities. Regional programmes also help to connect current and future leaders in the countries and foster regional integration of energy systems in future.

Support for regional cooperation among NGOs and think tanks would help to extend expert knowledge and address the problem of lack of data and analyses in the countries in question. Agora Energiewende is currently working on such a project, bringing energy policy think tanks and institutes across the Western Balkans together with German partners. The aim of the project is to establish a regional network of think tanks, which would develop and exchange on science-based, cost-effective and politically feasible solutions for power system transition (Agora Energiewende 2018c).

7.4 Awareness Raising, Research and Education

Public awareness of the social and economic benefits of renewable energy and energy saving and of the negative impacts of fossil fuel and nuclear energy production is absolutely necessary for the social acceptance of and active public engagement in decision-making processes on energy. Because of the Soviet legacy, the levels of political activism, social trust and ownership in the region are relatively low.

Support for local and regional NGOs and civil society initiatives working on climate and energy issues with communities and citizens is therefore critical too. Currently, several NGOs in Georgia, Armenia and Ukraine are working on establishing or strengthening the work of energy cooperatives, which are still very rare in the region. Study visits and cooperation with European and German energy cooperatives could be crucial for building trust in cooperatives in countries in which they are often associated with negative Soviet-era experiences.

49. For more information see Section 2.2 on regional energy cooperation.

50. For more information see https://www.giz.de/en/worldwide/31746.html.

Although as part of the Soviet legacy, education systems in many countries of the region are traditionally technically oriented, teachers and university professors grew up with the conventional energy paradigm and are sceptical towards renewables. Educators may lack sufficient knowledge of smart grid technologies and dealing with the variability and volatility of renewable energy production (IRENA 2017). Dedicated energy research centres at universities or science academies often lack funding and resources. Cooperation on research and education, including dual degree and vocational programmes and university exchanges, could therefore significantly increase local expertise on renewable energy and energy efficiency technologies.

City and municipality partnerships on sustainable energy with EU cities directly and as part of the EU Covenant of Mayors Initiative should be further strengthened. As a rule, municipalities across the region are more interested in energy-saving initiatives than the authorities at national level and are therefore more willing to cooperate. Identifying and showcasing successful lighthouse projects on renewable energy and energy efficiency in the region can also help to increase public awareness and accelerate the energy transitions in the countries in question.

8. Conclusion

The countries in South East and Eastern Europe, South Caucasus and Central Asia have *enormous potential* for deploying renewable energy technology and energy efficiency measures. However, this potential remains largely untapped, as the region has made *no significant progress on deployment of renewable energy* in recent years. During 2015 and 2016, 18 countries of the region, covered by this report, added only a little more than 2 GW of new renewable power capacity, with hydropower accounting for 70 per cent of these additions. By comparison, Germany alone installed 5 GW of onshore wind energy the same year. By the end of 2016, total installed renewable power capacity in the entire region reached 85 GW, less than in Germany, which reached 104 GW in 2016.

Such slow progress is a result of multiple *barriers and challenges* that hinder energy transition. Most countries of the region have *inherited energy systems* from the Soviet era, characterized by *strong centralization and monopolies*, as well as large-scale and inefficient generation facilities. In many cases, government officials have a vested interest or close ties with energy business structures, with little or no interest in changing the status quo, thereby blocking market entry to new players.

High fossil fuel and nuclear energy subsidies, present across the region, and *artificially low energy tariffs* significantly reduce the competitiveness of renewables and discourage investment. Due to unstable regulatory frameworks, market uncertainty and a range of administrative barriers, the *investment climate in the region remains insecure*. This translates into *high costs of capital* for renewable energy technology and *limited access to affordable finance*. *Technical capacity* as well as the level of *public engagement* and *awareness* of the benefits of renewables and energy saving remain very *low*.

Energy transition in the region would be extremely beneficial from the social, economic and political standpoints, and a number of *drivers and opportunities* could foster the process. Currently, the majority of countries are net energy importers, with fossil fuel energy imports ranging from 30 to 90 per cent of the total energy use across the region. The deployment of renewable energy and energy efficiency measures could therefore help to solve pressing *energy security* and *energy poverty* issues in these countries.

Investment in renewable energy would encourage *economic growth* and the creation of new *domestic jobs*, helping to slow the rising rural depopulation and labour emigration across the region. It would also help to dramatically *reduce air pollution*, the high number of deaths and *health issues*, as well as multiple negative effects on *the environment* resulting from fossil fuel and nuclear energy generation. Deployment of decentralized renewable energy could also help to significantly *advance democratization*, *reduce corruption* and *foster regional cooperation* and *peace-building*.

With the *targeted and concerted cooperation of Germany, the European Union and international organizations*, the region could overcome numerous challenges and significantly accelerate its currently slow pace of energy transition. This cooperation should include *know-how transfer* and dialogue on favourable sustainable energy legislation and investment climate, as well as *technical capacity-building* on integration, planning and operation of renewable energy.

Increased financial support and the introduction of *de-risking and financing mechanisms* would help to decrease the cost of capital and enable access to affordable finance. Programmes supporting *awareness-raising*, *research and education* on renewable energy and energy efficiency, as well as financial support and capacity-building for civil society and initiatives would help to increase public engagement and support for energy transition. Last but not least, there should be a focus on *regional cooperation and cross-border power system integration*, which would help to accelerate the energy transition across the region.

A number of highly promising regional energy initiatives, including by the EU and IRENA, already exist and should step up their support. *Best practices* on the deployment of decentralized renewable energy and energy efficiency measures can already be found and some have high potential to be replicated across the region. Three successful examples from Georgia, Ukraine and Kyrgyzstan have been presented in this publication.

List of Abbreviations

BMWi	German Federal Ministry for Economic Affairs and Energy
CENN	Caucasus Environmental NGO Network
EBRD	European Bank for Reconstruction and Development
EAEU	Eurasian Economic Union
EEA	European Environment Agency
EU	European Union
FIT	Feed-in tariff
FS	Frankfurt School of Finance and Management
FT	Financial Times
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GW	Gigawatt
IEA	International Energy Agency
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
KfW	German Development Bank (Kreditanstalt für Wiederaufbau)
KyrSEFF	Kyrgyz Sustainable Energy Financing Facility, EBRD credit line for energy efficiency projects in Kyrgyzstan
kWh	Kilowatt-hour(s)
MW	Megawatt
NAMA	Nationally Appropriate Mitigation Actions
NGO	Non-governmental organization
OECD	Organisation for Economic Cooperation and Development
PPA	Power Purchase Agreement
REN21	Renewable Energy Policy Network for the 21st Century
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WECF	Women in Europe for a Common Future
WHO	World Health Organization

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Interviewees
The author thanks the following experts for insightful background interviews for this research: Marina Olshanskaya (Avant-Garde Energy), Jozsef Feiler (European Climate Foundation), Borko Raičević and Gabriela Cretu (Energy Community Secretariat), Jasna Sekulović (Deutsche Gesellschaft für Internationale Zusammenarbeit), Irina Stavchuk (Ecoaction/Climate Action Network – Eastern Europe, Caucasus and Central Asia), Marcin Ścigan, Prasoon Agarwal and Anuar Tassymov (International Renewable Energy Agency), Sonja Risteska (Agora Energiewende), Astghine Pasoyan (Foundation to Save Energy), Angelina Davydova (Russian-German Bureau of Ecological Information), Ilia Yeremenko (Ecoclub), Georgy Safonov (Higher School of Economics), Damjan Bogunovic (Heinrich-Böll-Stiftung), Michael Yulkin (Center of Environmental Investments), Duška Kudra and Jelena Ivanić (Center for the Environment) and Mirjana Jovanović (Belgrade Open School), as well as Nurzat Abdyrasulova (UNISON Group/European Bank for Reconstruction and Development), Roman Zinchenko (Greencubator) and Anna Samwel (Women Engage for a Common Future).

Imprint

Friedrich-Ebert-Stiftung | Dept. for Central and Eastern Europe
Hiroshimastr. 28 | 10785 Berlin | Germany

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This publication is printed on paper from sustainable forestry.

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ISBN
978-3-96250-254-6