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Energy Transition in Ukraine: Renewable Energy in the Context of Institutional Change

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A number of sectoral reforms have lately been introduced to the Ukrainian energy market. Energy subsidies have been cut and domestic gas consumption has been reduced significantly. Reforms in recent years also affect the production of energy from renewable sources. Policy alignments with the European Union and attempts to liberalise the energy sector create a unique window of opportunity for the country. By investigating the political and regulatory framework, and by drawing from the experience of the German energy transition, the article provides a brief analysis on how market liberalisation and renewable sources can play a significant role in promoting democracy in the Ukrainian energy sector.

Keywords: Ukraine, Energy Transition, Renewable Energy Sources, Reform, Institutional Change, Post-Soviet Transition

Introduction

Ukraine is a key transit country for Russian natural gas supplies to Europe and therefore of great importance to Europe's energy and security policies. In 1974, the Soviet Union became a net exporter of gas to Western Europe (Shabad, 1976). Since then, energy relations between Russia and the European Union (EU) have been a continuous subject of debate (Svyatets, 2016). Today, Ukraine finds itself at the very frontline of the EU-Russian relationship over European energy dependency and security, acting as an important transit and storage hub for Russian gas supplies to South-East and Central Europe (Balmaceda, 2013). Since the Maidan protests of 2013-14, most outside attention paid to Ukraine has focused on the attempted economic and democratic reforms and the war in the country's East (Åslund, 2015). However, energy lies at the centre of Ukraine's struggle to develop a stronger democracy and a functioning state apparatus. A number of sectoral reforms have lately been introduced into the Ukrainian energy market. Energy subsidies have been cut and domestic gas consumption reduced significantly. Reforms in recent years have also affected the production of energy from renewable sources. Policy alignments with the European Union and attempts to liberalise the energy sector have created a unique window of opportunity for the country. By investigating the political and regulatory framework and drawing from the experience of the German energy transition, the article provides a brief analysis on how controlled market liberalisation and renewable sources can play a significant role in promoting democracy in the Ukrainian energy sector.

The energy sector in Ukraine is largely controlled by a non-transparent network of wealthy individuals who extended their already considerable power after the collapse of the Soviet Union. In the first years of independence after 1991, members of interest groups successfully transformed individual power into personal wealth and accumulated political influence. Ukraine's post-Soviet transition repeatedly stalled as successive governments failed to implement necessary economic and political reforms. The country's finances became more stable in the mid-1990s, but sustained economic growth was elusive until the mid-2000s (Åslund, 2015; Balmaceda, 2013). Growth in the following years was spurred not by economic reforms, but rather by an increase in the export volume of raw commodities. Subsequently, the economy was severely affected by the global financial crisis of 2008 and the recession saw the country lose one-fifth of its gross domestic product (GDP) (Balmaceda, 2013). The sequence of setbacks hindered the country's economic transition and the government was unable to reduce its dependency on energy imports. In states undergoing post-Soviet transition, the likelihood of successful regime transition towards a market economy is shown to be closely related to a government's ability to implement reforms in the energy sector (Obydenkova, 2010). The continuing dominance of oligarchs

within Ukraine's energy market, therefore, can be seen as emblematic of the difficulties that the country has been facing more broadly in its transformation to democracy and a free market.

Moreover, Ukraine is one of the most carbon-intensive economies in the world, with the burning of coal accounting for more than half of its carbon dioxide (CO2) emissions (Savitsky, 2015). According to the United Nations, fuel combustion in Ukraine accounts for almost one percent of all global emissions. As a result, Ukraine is the 21st-biggest emitter of greenhouse gases (GHG) from the burning of fossil fuels, while only the 31st-largest country in the world in terms of population and 63rd in terms of economic output (UNFCCC, 2015; World Bank, 2015; World Bank, 2017). Since the Chernobyl nuclear disaster of 1986, atomic energy and Ukraine have been fused in collective memory. Today, nuclear power accounts for more than 50 percent of Ukraine's electricity production and 20 percent of its primary energy supply (Nabiyeva, 2016). Although radiation from Chernobyl still affects the wellbeing of people in parts of Ukraine, Belarus and Russia, the Ukrainian government has maintained the use of nuclear energy (Greenpeace, 2016). With coal and nuclear power, Ukraine gets its primary energy and electricity supply from sources that are both non-renewable and environmentally harmful.

The technical capabilities of Ukraine's power sector are set to become increasingly strained. Without modernisation, nuclear energy generation is expected to be operational only until 2030 and the existing network of coal-fired power plants in the country is in need of extensive upgrading and replacement (IRENA, 2015). In addition, conditions in Ukraine's coal sector have been reshaped fundamentally since the outbreak of war in the country's East in 2014. Some 95 percent of hard coal deposits are located in the Donets Basin, in the war-torn Donbas region. As of July 2015, only a minority of mines was still in Ukrainian-controlled territory (23 out of 82), and those remaining under government control were damaged by the conflict. Consequently, coal production is unlikely to return to its previously high levels (Savitsky, 2015). The circumstances leave Ukraine short of fuel sources, forcing the government to ramp up energy imports, including from separatist-controlled territory. The increase in energy dependency puts pressure on the state budget and intensifies already severe political disputes in the greater region (Alexe, 2017).

This article aims to examine the window of opportunity that is opening up for Ukraine amid the ongoing crisis and the subsequent changes in the energy market. The promotion of renewable energy sources (RES) can play a significant role in providing a sustainable source of energy while reducing dependency on imports generally and coal specifically. Recent changes in Ukraine's energy policy indicate that the government seeks to boost the generation of renewable energy and reduce dependency and inefficiency within the sector. In particular, the authors analyse the conditions for small-scale and private sector use of renewable energy in Ukraine by considering Germany's transition experience of enabling the public's access to renewable electricity and heat generation. By investigating the regulatory and political framework of Ukraine's renewable energy sector, the authors aim to provide evidence that supports the idea of an early stage energy transition in Ukraine. The article adds to the existing work on the Ukrainian transition process towards a well-functioning market economy, with a specific focus on the energy sector and renewable sources.

Energy Transition

The term 'energy transition' describes the shift from one economic system dependent on one or several energy sources and technologies to another (Fouquet, Pearson, 2012). Over the course of the past two centuries, several energy transitions took place (e.g. from biomass to coal to petroleum), all characterised by many influencing factors and environments. In the historical context of European energy transitions, the main factors influencing transition were resource availability, industrial and household energy demand as well as institutions and government policy (Gales et al., 2007). While the pace and scope of each transition was different, some general features of what constitutes a transition can be identified. First, for any transition in the field of energy to take place, new energy sources and services have to be cheaper than the incumbent sources (Fouquet, 2010). Second, considering that new forms of energy initially start at higher levels of associated costs, any new form of energy technology begins in a niche market. Over the course of time, technological development allows new energy sources and services to become more accessible (Grubler et al., 1999). Third, the role of institutions in enabling new forms of energy to break out of the niche and get a foothold in the market is decisive in the occurrence and success of a transition (Foxon, 2011).

Energy transitions in the past mainly took place against the backdrop of achieving an increase in direct private benefits on both the demand and supply side. The transition in the 21st century towards renewables, by contrast, differs to the extent that it is not mainly oriented towards individual cost

reduction, but aims to achieve the public good of avoided risks from climate change and negative environmental externalities. Hence, the aforementioned third key feature of a transition – the active involvement of public institutions – becomes increasingly relevant, as the provision of a public good requires deliberate state management (Fouquet, 2012).

However, the concern over climate change was not the main reason for Germany's policy shift towards renewable energy – one of Europe's most well-known 21st-century energy transitions. The root cause of the *Energiewende* ('energy turnaround') was the desire of communities to become independent of big utilities and maximise energy self-sufficiency in their municipalities and households. The grassroots renewables' support in Germany and other parts of Europe originated particularly in the anti-nuclear movement of the 1970s. Ongoing protests and debates over nuclear energy forced politicians to gradually implement a regulatory framework that allowed citizens to generate and consume their own energy from renewable sources. Increasing public environmental concerns and the growing threat of climate change would later boost popular support for the promotion of renewable energy (Jungjohann, Morris, 2016). Within the theory of sustainable energy transitions, the political framework and institutional arrangements for the inclusion of new actors in the energy market are indeed considered decisive factors for a successful transition. The more the energy market is participatory and open, the more likely is a transition towards new technologies and sustainability. This results in the appearance of different methods and practices but also in the participation of new social groups in the energy market, particularly new producers (Hoggett et al., 2013). In consideration of the fact that energy transitions typically cover a considerable time span, the continuity and reliability of policies become additional factors of influence. Moreover, policies that concern a multitude of actors involved in the market need to be aligned as to cover all sources of energy (Grubler, 2012). What constitutes an un-aligned approach is the example of fossil fuel subsidies, which play an important role in the transformation of the Ukrainian energy sector, and will be referred to in more detail in this article.

Germany is at the forefront of Europe's energy transition and, with its strong focus on energy price-liberalisation, long-term climate policy and decentralised production and consumption of renewable energy, sets an unprecedented example of the interplay between policy decisions that determine the nature and speed of transition (Jungjohann, Morris, 2016; Angel, 2016). In 1991, after years of continued protests and grassroots activities by local citizen groups, the German Renewable Energy Act (EEG) that would bring about fundamental changes to the energy sector became law. Within the EEG, the 'feed-in tariff' (FIT) is arguably the most-recognised instrument supporting the production of renewable energy. The FIT gives producers of renewable energy a guaranteed payment for each kilowatt-hour (KWh) of energy they feed into the grid throughout a fixed period of up to 20 years. By guaranteeing these actors' place on the market, which include new players and citizens, and the long-term remuneration on their initial investments, the FIT led to the rapid growth of distributed and small-scale RES facilities in Germany. In combination with the grid priority that is given for electricity from wind, solar and biomass ahead of conventional energy, the EEG in effect gave individual and community-owned renewables projects long-term investment security (Appunn, 2014). As a result, in 2015 almost one-third of electricity in Germany was generated from renewable sources. The same year, Germany saw more solar panels installed than any other country in the world, and trailed only China and the United States in terms of wind power.[1] In 2012, half of all investments in new renewable energy facilities were contributions from private individuals. Another 40 percent came from small- and medium-sized enterprises (SMEs) and institutional investors. Twenty years after the initiation of the EEG, the four biggest German utilities were making just one percent of all investments in renewable energy (Jungjohann, Morris, 2016). Despite this lack of participation by the big players, the renewable energy sector now employs more people than the German oil, gas, coal and nuclear industries combined (Kunze, Becker, 2014). Germany was not the initial creator of the FIT law, yet the way it has been applied under the EEG has been adopted by almost 100 countries. Thus, the EEG is considered to be 'one of the most emulated pieces of legislation in the world in any field,' (Jungjohann, Morris, 2016, p. 169).

The cost of energy production from solar, wind and other forms of renewable energy continues to decline each year, quickening the pace of the global transition from fossil fuels to alternative sources. This transition is thought to offer an opportunity to democratise the means of energy production around the world. As the evidence from the German energy shift suggests, large and centralised energy corporations have seemed hesitant about their role in the energy markets of the future, while decentralised initiatives have been responsible for most of the significant increases in renewable energy generation. Under the given circumstances, conventional energy providers are expected to delay the phasing out of the fossil fuels from which they continue to profit, which in turn would slow down the transition and accelerate the impending climate crisis (Jungjohann, Morris, 2016). Leaving centralised

market structures unchallenged will not only have serious consequences for the world's climate, but has also been described as a missed opportunity to make the energy sector as a whole more democratic.

As industrialised countries slowly shift away from fossil fuels as their main source of energy, countries that remain dependent on exporting fossil fuels will face serious consequences in the future. It is expected that electrification across sectors and digitalisation will over time foster the decrease in energy prices (Rifkin, 2015). Hence the fossil fuels business is set to become significantly less lucrative on global markets. The economic implications of a long-term price decrease and the restructuring of the energy sector led by renewable sources will cause profound changes in social and economic realities (Mason, 2016).[2] This new economic era will particularly affect the countries of Eastern Europe and Central Asia, most of which still largely depend on oil, coal and gas extraction (Kuczabski, Michalski, 2014). For countries that do not manage to move away sooner from fossil fuel extraction and trade, the forthcoming economic transition will likely decrease their market opportunities, productivity, employment and prolong environmental harm (Rifkin, 2015).[3] Evidence from the post-Soviet transition experience suggests that regulatory processes commonly applied in Western countries cannot simply be transposed as a standard recipe for economic prosperity (Hirschhausen, Waelde, 2001). This also holds true for the transition to renewables. Yet, the lessons learned from the German experience will be especially relevant for understanding how non-pioneering countries, such as Ukraine, might adopt renewable energy technologies and pursue their own transition path.

Energy Transition in the Post-Soviet Context

For many former Soviet states in Eastern Europe and Central Asia, economic growth is driven by fossil fuel exports (IEA, 2015). In these regions, wealth creation from resource extraction has ensured a certain degree of economic development; however, it has not necessarily fostered democratic institutions. Rather, it has encouraged the centralisation of power and rent-seeking behaviour of politicians and their patrons (Ross, 2001). Corrupt rulers tend to use some of the revenues from extraction to placate the population with new services and low taxes, while at the same time distributing much of the spoils among political and business cronies in order to consolidate their power. A key precondition for this model is the existence of authoritarian institutions and a high degree of political and economic centralisation (Acemoglu, Robinson, 2012). Power and market centralisation were key features of the planned Soviet economy. A quarter-century after the former Soviet states gained independence, large-scale centralisation in the energy sector remains an important component of economic life in the greater region. What is referred to as the 'resource curse' in economic literature has also played a considerable role in the establishment of democratic institutions in Ukraine (Ross, 2001).

After the election of Viktor Yanukovych as president in 2010, the Ukrainian coal sector was largely privatised and monopolised. To this day, ownership of the coal and electricity sectors remains highly concentrated (Savitsky 2015; Zachmann, 2016).[4] Since its independence in 1991, Ukraine has heavily subsidised energy, particularly natural gas, to consumers. In the past, households paid just 10 percent of the market price for heat generated from gas. Before diversifying its supplies through deals with Norway, Poland, Hungary and Slovakia in 2014, two-thirds of gas supplies to Ukraine came from Russia, which heavily encouraged investors to speculate on price differences. The foregone revenues resulting from gas subsidies and speculations deprived the Ukrainian economy of around 10 percent of its GDP annually (Nabiyeva, 2016; Reuters 2014; IRENA, 2015). A significant amount of subsidies was also consumed by the coal industry, with 3.8 percent (1.3 billion Euros) of the 2012 state budget going into the sector (Savitsky, 2015).

Leading international institutions and scholars have pointed out that subsidies to the fossil fuels sector deprive the global economy of both the conditions needed for transparent energy pricing as well as the financial means to transition towards renewable energy production; the only means considered to guarantee long-term climate protection (UN, 2017; GSI, IISD, 2017; IMF, 2013; IEA, OPEC, OECD, World Bank, 2011; UNEP 2008). The issue of subsidy schemes becomes especially relevant for Ukraine, in consideration of its ongoing transition towards a stable market economy and the hardship caused by budget deficits and corruption. In 2016, the government attempted to reduce corruption and subsidies in the sector by unifying gas prices to industries and consumers. While prices for consumers increased, causing public dissatisfaction, the government successfully reduced the state budget deficit (Nabiyeva, 2016). The authorities seem committed to improving the economic environment, which would give Ukraine better access to the EU market and increase the foreign direct investments needed for structural reform of the economy, including the energy sector (Åslund, 2015). In fact, the overriding principle behind recent energy policy reforms in Ukraine is the government's need to reduce fiscal losses from

subsidies and to decrease the country's dependence on energy imports. However, widely unaddressed on the policy level is the window of opportunity opening up for promoting renewable energy and thereby supporting the process of institutional transition. Democratic development in Ukraine has been impaired for many years. The government's controlling functions and its ability to responsively and efficiently implement policy continue to be limited (Democracy Barometer, 2014). In addition, conditions have worsened since the outbreak of war in Eastern parts of the country, with the situation unlikely to be resolved in the foreseeable future. Yet, countries that have experienced severe crises in the past may still have the chance to emerge stronger and more democratic, as Germany has shown (Jungjohann, Morris, 2016). Successful energy sector reforms play an important role in this regard.

Despite the above-mentioned widespread dependency on fossil fuels in the region, a number of Central and Eastern European countries generate some of their energy from renewable sources, namely Latvia with 33 percent; Estonia 26 percent; Romania 21 percent; Lithuania 20 percent; Slovenia 19 percent and Bulgaria 14 percent (Kunze and Becker, 2014). This is not the result of recent transition, but is due to the fact that their renewable-based electricity generating capacity almost exclusively originates from the decades-old but still considerable infrastructure of hydropower stations inherited from the Soviet Union (OSCE 2017). Unlike in Northern, Western and Southern Europe privately funded and smaller participatory energy initiatives in wind and solar energy are virtually non-existent in this part of the continent. Yet, it is precisely self-determination and the participation of small actors that help to foster a stable and inclusive energy transition (Kunze and Becker, 2014). For the aforementioned countries, as much as for Ukraine, this kind of participation in the energy sector will be difficult to achieve, given the current lack of social infrastructure connecting the public sector, citizen cooperatives and private businesses. Renewable energy and energy efficiency initiatives might also be a hard sell to citizens, most of who tend to see alternative technologies as too costly.

That is why – apart from the fact that Ukraine is not a member of the EU – an important aspect is the need for a further expansion of economic co-operation between Ukraine and the wider European community through the alignment of energy policies. In the current absence of wide-scale public support and notable domestic drivers towards renewable energy, close international cooperation should be considered as one of the key enabling factors for the uptake of renewable energy and energy efficiency. This will also become increasingly relevant as most other European countries gradually shift towards replacement of coal and nuclear power plants with renewable sources, increasing their energy independence in the process (Chernyak et al., 2016). Another argument that speaks in favour of Eastern European states shifting to renewable energy is of a patriotic nature: the transition could help to bring about energy independence from Russia, which many of them have been seeking for a long time. Finally, it is in the fiscal interest of governments to move their energy sector away from monopolistic and informal structures which are inherent to the fossil fuels-based model (Kunze and Becker, 2014). Improving the energy sector will remain a pressing issue for Ukraine, since it is one of the most corrupt and centralised areas of the economy (Åslund, 2015). However, if the government wants to address the economic crisis while improving democratic institutions, the focus of the country's energy policy should involve the increase in renewable sources deployment (Savitsky, 2015). This task will be as much of a challenge for Ukraine as it is an opportunity, due to the persistent economic and social conditions in the country. Nevertheless, the successful implementation of reforms promoting renewable energy, with the involvement of the European community, can help Ukraine leapfrog stages of transition that would otherwise mean additional years of hardship.

The Ukrainian Energy Market

The present shape of Ukraine's energy market mainly results from the fact that energy was a quasi-public good during the Soviet era, provided at low or no cost by the state. Access to artificially cheap energy sources significantly affected the development of Ukrainian industries, resulting in energy dependency on Russia and high energy intensity as well as inefficiency. Unfortunately, the attempted overhaul of the Ukrainian energy sector during the 1990s was accompanied by only limited reforms and the sector remains highly corrupt, inefficient and over-regulated (Balmaceda, 2008).

Ukraine's energy sector is officially operated by state-owned companies Naftogaz, Ukrenergo and Energoatom. The price of electricity and energy was regulated and subsidised by the state until the price liberalisation process of 2015. This helped the government to significantly improve energy efficiency and to partially reduce corruption within the institutionalised subsidy schemes for energy consumption (Markevych and Omelchenko, 2016). Despite improvements in the financial state of affairs in the state-controlled energy sector, power struggles between the main actors at the Ministries of Energy and

Economics and the state-controlled companies Naftogaz and its subsidiary Ukrtransgaz continue to raise fear of re-oligarchisation attempts (Hromadske, 2016). Hence, price liberalisation is seen only as the first stage in the reform of the Ukrainian energy market, which overall requires further structural reforms in order to abolish centralised and monopolistic structures which ultimately create barriers to more sustainable and democratically institutionalised forms of energy provision.

Currently, Ukraine is a net importer of energy. The country's production covers 73 percent of primary energy demand, with the remaining sources being mostly imports from neighbouring countries such as Russia, Kazakhstan, Turkmenistan and Belarus. Ukraine's energy consumption is relatively high: until recently it was the biggest consumer of natural gas in Europe, at about 50 billion cubic metres per year, while only Germany consumed more. However, gas consumption decreased by 16 percent in 2015, following a steep recession. Despite some improvements in energy efficiency, Ukraine remains one of the most energy-intensive economies in the world (Energdata, 2016; Reuters, 2014). Over the past two decades, the primary energy mix of Ukraine has consistently and almost exclusively been made up of natural gas, nuclear and coal. In 2015, around 20 percent of the country's primary energy was generated from atomic energy, 30 percent natural gas, and 34 percent coal. Around 10 percent of the energy came from liquid fuels such as petroleum. The share of renewable sources within the Ukrainian energy mix remains low, at between 2 and 3 percent (Ukrstat, 2014).

Nevertheless, there are several noticeable trends to be witnessed in the Ukrainian energy sector. The share of natural gas in the energy mix has been constantly decreasing. In 2013, before the outbreak of war in Eastern Ukraine, the share of natural gas in the energy mix was 34.1 percent. It then dropped to 31.6 percent in 2014 and to 30 percent the year after. At the same time, the share of coal in the energy mix remained relatively unchanged, with a small decline from 35.8 percent in 2013 to 33.7 percent in 2014. The share of nuclear energy grew from 18.9 percent in 2013 to 22 percent in 2014 and to 24 percent in 2015 (Ukrstat, 2014). The more recent increase in nuclear energy may be explained by the split with Russia, as the main gas exporter, over provision to Ukraine and the partial occupation of the Donbas region, which used to be the main supplier of coal to Ukrainian power plants.

Although the share of renewable energy in Ukraine's primary energy mix is low, biomass was responsible for around 6 percent of power production in 2014, with its total use increasing by 25 percent from 2013. With its outstanding agricultural potential, Ukraine could significantly increase the share of biomass in renewable energy production in the near future (Cabinet of Ministers, 2015; IRENA, 2015). To date, hydropower remains the dominant renewable energy source (84.6 percent of all renewable energy), followed by wind (10.3 percent) and solar energy (3.9 percent). The annexation of Crimea, among other things including the economic downturn, badly damaged the Ukrainian solar energy sector. In 2012, an Austrian private investor with support from the Ukrainian government built and launched a solar park with a 100-MW photovoltaic power station in Perovo, Crimea – at the time the fifth-biggest solar farm in the world. The initial idea was to gradually increase the capacity of this solar station, which could have contributed notably to changing the energy balance of the country. However, in 2015 the operation of all solar and wind energy plants on the Crimean Peninsula was halted (Zerkalo Nedeli, 2014).

Legal Reforms

Ukraine's development of energy production from non-fossil sources is the most dynamic among the other members of the Commonwealth of Independent States (CIS).[5] Since 2010 the country's renewable energy production capacity has increased tenfold, reaching 2.7 percent of total energy production in 2014. Yet, compared to Ukraine's neighbours in the EU, the share of renewable sources remains low (Centre for Research, 2017; Ukrstat, 2014). Ukraine became a member of the European Energy Community in 2010 and in doing so accepted several obligations, of which one is to increase the share of renewable sources in its overall energy mix to 11 percent by 2020. In order to meet this ambitious target, Ukraine needs to establish a sound legal framework for the generation of renewable energy. This is considered one of the first necessary steps towards successful reform of the domestic energy sector, which includes not only the transition to renewable energy but also increasing energy efficiency (Ministry of Energy, 2017).

One of the main documents aiming to initiate the reform process is the 'Energy Strategy of Ukraine for the period until 2030' ('Energy Strategy'), first issued in 2015. The strategy foresees an increase in the share of RES in the energy mix to 11 percent by 2020 and as much as 30 percent by 2030. The Energy Strategy also envisions policies designed to further decrease the consumption of natural gas. By 2030, gas consumption is expected to drop by 30 percent through increased energy efficiency and the

modernisation of domestic energy infrastructure. The strategy also aims to boost energy security by diversifying sources of supply (Ministry of Energy, 2015). Aside from the 'Energy Strategy', one of the breakthrough acts of legislation concerning RES is Law No. 514-VII, known as the 'Law of Ukraine to ensure competitive conditions for electricity production from alternative sources of energy', passed by the Ukrainian Parliament in 2015 (State Parliament, 2015). The law requires regional energy suppliers to buy solar energy produced by individual households. As a result, in the first three months after the law's passage, the number of private households equipped with solar energy panels rose by 84 percent (Golos Narodu, 2016). An earlier important turning point was the introduction of the 'Green Tariff' in 2008, Ukraine's version of the FIT. The 'Law of Ukraine to establish the Green Tariff' provides a decade-long guarantee of demand to the producers of all types of wind, solar, biomass and hydropower with a capacity of up to 10 MW (State Parliament, 2008). Initially, the law was criticised by energy producers for not being applicable to biogas, which is a by-product of biomass and competes with natural gas on the energy market. The law was later amended to include biogas under the 'Green Tariff', following persistent protest by small-scale energy producers (Vesnyanka 2010). The Ukrainian 'Green Tariff' is one of the main legislative instruments for encouraging the use of renewable energy. Shortly after the introduction of the tariff, the government, as well as domestic and foreign NGOs, launched information campaigns to promote business opportunities for firms and individuals (Energylogia, 2016). Nevertheless, mistrust among Ukrainians towards state authorities remains high, especially regarding the fulfilment of long-term obligations by the state. Uncertainty over government promises deters many enterprises from investing in renewables and business projects based on the FIT principle. Greater legal protection of investments in renewable energy is therefore needed in order to attract more attention. Moreover, setting up renewable energy is prohibitively expensive for most private households. The cost of installing a solar panel on the roof of a private house in Ukraine is around €5,000 (Golos Narodu, 2016). This high initial cost prevents many Ukrainians from benefiting from the 'Green Tariff'. More affordable loans for solar panels could therefore help the implementation of Ukraine's FIT.

Political Framework for Energy Transition

Evidence suggests that Ukraine's energy transition can be achieved only through structural reforms, including a legal and political framework that establishes a democratically organised energy sector. This is unlikely to happen without the political will of Ukraine's governing class. In this regard, there are positive signs to be observed from within the Ukrainian energy sector as well as from policymakers. One such sign is the implementation of the 'Third Energy Package of the European Energy Community' ('Third Energy Package'), to which Ukraine is a contracting party (Energy Community, 2017). By aligning national legislation with the provisions of the 'Third Energy Package', Ukraine has in effect initiated the de-monopolisation of its energy market. This process includes new regulations which open markets, establish public service obligations and, importantly, protect vulnerable customers. It also features third-party access to the market, namely for SMEs, citizen co-operatives as well as strong and independent regulators (Energy Charter 2015, p.5). To this end, the 'Gas Sector Reform Implementation Plan' was introduced in April 2015. Shortly afterwards, the new 'Law on the Gas Market' was adopted in an attempt to increase competition on the gas market. The law was drafted with the help of the European Energy Community. Within a month of coming into force in October 2015, the share of private companies importing natural gas to Ukraine increased by 60 percent (Energy Reforms, 2015, p.5). The increase in private companies on the market generated more competition, which pushed down prices and increased efficiency. Above all, the provisions of the law oblige Ukraine to increase the share of renewable sources, including biogas, in its energy mix (Energy Charter 2015, p.7).

However, the implementation of the 'Third Energy Package' alone will not solve the issue of monopoly power structures and kleptocracy in Ukraine. The state monopoly on the energy market is seen as one of the main obstacles to developing a more sustainable energy sector. Implementing the law's provisions on third-party access and regulator independence was an important step towards de-monopolising the market. Yet, deeper and more comprehensive reforms are needed to create a market that allows the broader society to access renewable energy both as producers and consumers in a democratic and inclusive way. Most of Ukraine's energy firms remain in the hands of the country's oligarchs. Such control has long been a crucial element in their vast network of personal wealth and political power. Since the oligarchs benefit under the status quo, often in circumstances fostering corruption, they can be expected to try to delay or block the democratisation of the energy market. At the same time, Ukraine's energy infrastructure is in great need of new investment, particularly in

renewables. Increasing the share of renewable energy will be hardly possible without transparency and clear market rules (Interfax, 2016; IRENA, 2015).

The conflict of interest between existing market players and the uptake of alternative sources of energy is evident. Most thermal power stations which produce electricity from coal are owned by oligarchs who for years have profited from their monopoly position, but not invested in the modernisation of production facilities or infrastructure. Owners of coal mines and thermal power stations are sometimes the same person, and many of their business interests and properties are located in the country's East, in some cases on both geographical sides of the succession conflict. The country's East is also most affected by the ongoing conflict, where a large number of people are still employed in the coal sector.[6] Businessmen use this fact to promote coal as a vital source of energy, framing themes of national independence and economic support for vulnerable parts of society in times of conflict. The popular perception of coal-based energy as essential to the economic survival of the country leaves no room for the promotion among the broader public of fundamental changes to the existing energy system and a shift towards renewable sources (Nabiyeva, 2016). Four years after the Maidan revolution, informal practices on the highest levels remain unabated and the economy is still ailing, even though these were among the main reasons for the uprising in 2013. Consequently, the democratisation of the Ukrainian energy sector will only be possible in conjunction with overcoming corruption, the abolition of oligarchical political systems and structural economic and social reforms.

One of the basic ideas of the energy transition is to place more energy production and distribution into the hands of citizens. Energy from wind, solar, hydro and biomass, thereby, should be accessible to everyone (REScoop, 2015, p.60). Under a perfect democratic transition, non-natural monopolies would not exist; since citizens or groups of citizens would be able to produce the amount of energy they need themselves, rendering large monopolistic structures obsolete. The promotion of renewables in Ukraine would likely liberalise the domestic energy market and take power away from the oligarchs, for whom the monopolisation of energy is an important source of wealth and influence (Energy Charter, 2015, p.10). Another central issue for Ukraine is the inefficient use of energy. The recent price liberalisation in the electricity sector partly reduced consumption and increased efficiency. However, the economy remains highly energy intensive and inefficient. Loosening pricing further would help change the perception by society of energy being a public good, which has been cultivated ever since Soviet times. While it has been shown that in low- and medium-income countries cheap energy in the form of subsidised fossil fuels benefits the wealthiest quintile of households six times more compared to the poorest quintile, the reform of energy subsidies calls for cautionary measures with respect to the protection of the poor. Liberalising prices is important in establishing a level playing field for all sources of energy, especially renewables. However, equally important is the provision of safety nets to vulnerable groups of society, to ensure an incentive to participate in the energy transition and to shield them from disproportionately higher energy prices (IMF, 2013).

The civil uprising in Ukraine in 2013-2014 brought many new politicians into the Ukrainian parliament and other governmental institutions. As a consequence, private and non-governmental institutions now receive more attention from their political representatives. There is a general feeling among non-state actors that these new authorities are more open to dialogue (Nabiyeva, 2016). Some of the new politicians seem to have an understanding of the necessity for sustainable economic development, a trend that may eventually result in the more active promotion of renewable energy by the state. Moreover, closer political and economic integration with the EU in form of the Association Agreement requires Ukraine to align its energy policy with EU standards. However, the Ukrainian political establishment still lacks politicians and political parties favouring an energy transition of the country over the status quo, which may be understandable given the current energy mix and socio-economic conditions in the country. In addition, few political parties promote democracy in the energy sector. The only significant party that lists renewable energy and environmental policies as top priorities is the Green Party of Ukraine. This party achieved relative success in the 1990s and managed to enter the *Verkhovna Rada* (State Parliament) with around 5 percent of the vote in the 1998 elections. Although some members are still present in regional governments, the party received only 0.24 percent of the vote in the parliamentary elections of 2014 and as a result is no longer represented in the Ukrainian Parliament (Green Party, 2017).

Conclusion

Comprehensive structural reform of Ukraine's economy can only succeed if state authorities simultaneously undertake fundamental measures to encourage the transition to renewable energy.

Energy remains one of the most corruptible, inefficient and socially vulnerable sectors of the country, so that reforming it continuous to be one of the most important challenges for the government. However, political instability, ongoing conflict and the partially remaining perception of cheap energy provision as one of the state's main obligations significantly complicate reform attempts.

Nevertheless, Ukraine is making some ambitious and persistent attempts at reforms through the implementation of its new 'Energy Strategy' and natural gas as well as electricity market regulations. Integration with the European Energy Community, as well as the establishment of national legislation on FITs both indicate that the state is committed to supporting renewable energy and its decentralised generation. Despite its current lack in developing renewables in comparison to EU Member States, Ukraine has great potential to increase the share of alternative sources in its energy mix and outpace its neighbouring states (IRENA 2015). The new 'Energy Strategy' foresees an increase of renewable sources in the energy mix to 11 percent by 2020 and 30 percent by 2030 (Ministry of Energy, 2017). By achieving these targets, the country could become one of the region's leaders in RES development. Progress in the energy transition and the achievement of the targets greatly depend on the ability of the country to effectively counteract corruption and carry out the de-oligarchisation and de-monopolisation of the economy and state governance system. In this context, Ukraine's energy transition is strongly linked to the overall democratisation of economic sectors and cannot be considered separately. Moreover, energy efficiency is crucial to the development of the entire Ukrainian economy, as it remains one of the most energy intensive countries in the world. The government-initiated liberalisation of gas and electricity prices is set to further reduce domestic energy consumption. However, price liberalisation alone, without modernisation of infrastructure and production technologies, will not provide sufficient energy efficiency improvements in the long term and can only be considered the primary stage of reforms. On average, it takes about two years to construct new gas turbines, six years to build a coal-fired power plant and even longer for nuclear power plants. Wind and solar energy, on the other hand, can be built in one to two years (Jungjohann, Morris, p. 272). As the German experience shows, a policy that gives citizens democratic access to renewables supports a fast transition towards energy independence and security, which is of crucial importance for Ukraine's aging energy infrastructure.

Despite the nuclear catastrophe in Chernobyl and its tragic consequences for Ukrainian society – there is to date no state strategy for a nuclear power phase-out. What is more, the burning of coal continues to cover large amounts of the country's energy needs. While democracy within the energy sphere has been largely marginalised in the past, the country's political leaders must develop an understanding of the urgency of a consistent and socially inclusive transition to renewable sources. It should therefore be welcomed that more recently politicians have started to promote alternative energy and democratic access to them on their agendas. Learning the lessons from the German energy transition and granting citizens legal access to renewable energy will help Ukraine to transition its energy sector and should be considered as a key element in steering the country's institutions towards a functioning democracy.

Notes

[1] China's solar power capacity more than doubled in 2016 and the country is now the biggest producer of solar power in the world. The two next-biggest total solar power installations in 2016 were made in Japan and Germany, with the United States in fourth place. Installed wind-power capacity in 2016 remained dominated by China and the US, with Germany in third place.

[2] Future societies that go beyond the traditional means of capitalism, as envisioned by Mason, will maximise the power of information technology in combination with renewable energy in order to reduce carbon emissions and prevent further deterioration of the global climate. The so-called post-capitalist economy focuses on how to efficiently allocate energy and electricity that is produced from renewable sources by means of digitalised energy-management systems. As production of electric energy from renewable sources becomes more transparent and universally accessible, co-operative approaches will be strongly promoted. This will break up monopolies, counteract rent-seeking business patterns and democratise the energy sector in the process. Central power structures and profit maximisation will become obsolete, putting economies that do not transition and remain dependent on export revenue from fossil fuel extraction at risk of crisis (Mason, 2016).

[3] The new economic reality (or so-called 'third industrial revolution') describes the overall digitalisation of communication, energy and the transport sector. It further contains the theory of an economy based on zero or near-zero marginal costs of production, including the close to zero cost of energy produced from renewables. The

creation of value within the energy sector under the zero-cost scenario will originate from service provision and managing the collective use of energy in efficient and digitalised ways, rather than from just selling units of power to individual customers. As a result, the third industrial revolution is projected to fundamentally change the business model of energy companies (Rifkin, 2015).

[4] Power generation from coal and gas is managed by five utility companies that operate 14 large-scale thermal power plants (TPPs), of which only three are owned by the state, while nine belong directly to Rinat Akhmetov's company DTEK, the largest private electricity producer in Ukraine. With the remaining two controlled by a closely associated businessman, Akhmetov effectively controls the market (Savitsky, 2015). Adding to this, the natural monopoly on electricity distribution and transmission networks is also controlled to 40 percent by DTEK, with another 36 percent owned by Ihor Kolomoyskyi, 10 percent partly controlled by Konstantin Grigorishin and 21 percent partly controlled by Alexander Babakov. Effective control of electricity distribution under state ownership is at 22 percent of the market share (Zachmann, 2016).

[5] The CIS is a supranational body that was founded on December 8, 1991, following the end of the Soviet Union. It includes the countries of Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Uzbekistan, as well as Turkmenistan and Ukraine acting as associate states.

[6] In 2013, an estimated 450,000 people in Ukraine worked in coal mining and processing and thermal power utilities (Savitsky, 2015).

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