

LEARNING FROM POWER SECTOR REFORM

THE CASE OF UKRAINE



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Learning from Power Sector Reform: The Case of Ukraine

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ABSTRACT

At the time of independence, in 1991, Ukraine had a monolithic state-run power sector. Its main concern was to transform the sector into a more efficient and competitive system that could be consistent with eventual European Union membership. A series of steps were taken in this direction—some unbundling of the sector; limited privatization; establishing a regulator; and creating a wholesale power market. Unfortunately, these reform steps did not achieve the reform objectives and, at the time, there was no political consensus on the path forward. The changing regional political landscape, especially driven by the Crimea crisis, raised a fresh impetus for the reforms as the sector faced new concerns. Security of supply concerns, particularly over gas from Russia and limited access to high quality coal mines, were suddenly centerstage for a country where the inherited system had excess supply even at peak demand. Sector reforms were undertaken to align more closely with the 2nd and 3rd European Union energy packages. This case study follows Ukraine power sector’s reform process and presents lessons learned that can be useful for other developing countries.

Keywords: power sector reform, electric utility, power generation, energy access, state-owned enterprise, regulation, electricity pricing.

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FOREWORD

“Rethinking Power Sector Reform” is a multiyear global initiative of the Energy & Extractives Global Practice that provides an updated assessment of power sector reform experiences across the developing world. The initiative aims to revisit and refresh thinking on power sector reform approaches, in the light of accumulated evidence about the performance of countries undertaking different types of reforms. The goal is to reignite the policy debate around reform approaches by articulating a new vision that incorporates lessons learned over the past 25 years. It also reflects on how recent technological trends and business models that are disrupting the sector may call for a new thinking on reform strategies.

Since the 1990s, a standard set of policy prescriptions for power sector reform has been widely used. These include vertical and horizontal unbundling of power utilities; private sector participation; creation of an independent regulator; achievement of cost recovery pricing; and the introduction of competition in power generation. While this package of reforms was, at least partially, adopted by several developing countries, momentum and uptake slowed considerably in the 2000s. There is a need to revise approaches in the light of 25 years of experience, evidence, and technological disruptions to provide practitioners with a flexible frame of reference that can help identify the types of reforms needed to improve the power sector in different country contexts.

Supported by the World Bank’s [Energy Sector Management Assistance Program](#) (ESMAP) and the [Public – Private Infrastructure Advisory Facility](#) (PPIAF), the initiative works with different partners and experts across the World Bank Group (WBG) and beyond to generate evidence, analysis and insights on key themes of interest to power sector reform practitioners and decision makers globally: cost recovery, utility governance and restructuring, power markets, regulation, and political economy. Findings and recommendations on each of these themes will be included in a forthcoming Flagship Report.

The initiative is strongly evidence-based, grounding its research in an in-depth exploration of the 25-year power sector reform journey of 15 World Bank Group client countries that represent a wide diversity of geographies, income levels, and approaches to reform. The selected countries are Colombia, Dominican Republic, Egypt, India, Kenya, Morocco, Pakistan, Peru, Philippines, Senegal, Tajikistan, Tanzania, Uganda, Ukraine, and Vietnam.

An important output of the project is a series of case studies – of which this is one – that provide a narrative of the reform dynamics in each country and evaluate the impact of reforms on key dimensions of sector performance including security of supply, operational efficiency, cost recovery and energy access. For a subset of countries that pursued deeper reforms – Colombia, India, Peru and the Philippines – the project also includes a series of free-standing case studies that evaluate the experience with wholesale power markets. The purpose of the case studies is to reflect upon the experiences of individual countries with a view to extracting lessons of broader interest to the global community. It is not the role of these papers to recommend any particular way forward for the countries in question.

These case studies, which constitute companions to the synthesis of the Flagship Report, are being published in the Policy Research Working Paper series of the World Bank. As such, the case studies represent the views of the authors alone and should not be attributed to the World Bank or to any other person or institution.

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ABBREVIATIONS AND ACRONYMS

DCFTA	Deep and Comprehensive Free Trade Areas
DISCO	Distribution company
ECU	Energy company of Ukraine
ENTSOe	The European Network of Transmission System Operators
ER	Energorinok (Single Buyer)
ER	Energoatom (State Nuclear Power Company)
IEU	Industrial energy union
Kbno	Khmelnitskoblenergo
MINENERGO	Ministry of Energy and Coal Industry
NERC	National Electricity Regulatory Commission
NEURC	National Commission for State Regulation of Energy and Utilities
RES	Renewable energy system
SEC	State Electricity Company
UE	NPC Ukrenergo (Transmission Operator)
UES	United Energy System
UHE	UkrHydroEnergo (State Hydropower Company)
WEM	Wholesale electricity market

1 INTRODUCTION

At the beginning of the 1990s, after Ukraine had become independent, the entirely state-owned power sector was high-cost and inefficient. There was immediate interest in reforming the sector along the lines of the England and Wales reform. Some steps towards this were taken, including unbundling, the creation of a regulator, limited privatization, and the creation of a wholesale power market.

These steps were not very successful in achieving the objects of sector reform and there were some attempts to strengthen the reforms. However, not all stakeholders, especially political ones, were in favor of the reform steps.

In parallel to these forces was the aim of some politicians to move closer to the EU, and to reform the sector in a way to achieve closer links. This factor was given major impetus after the 2014 Crimean crisis. The concerns for security of energy supply and for closer links with the EU drove the Ukraine to pass legislation in line with the 2nd and 3rd EU energy packages and this is expected to bring about a fully reformed and competitive sector. Also, the EU-Ukraine Association Agreement, and Membership in ECS Agreement Between EU and Ukraine were signed.

The index of announced and actual reforms is shown in Figure 1² and this indicates that rapid progress towards the full range of steps to reform as recommended along the lines of the Washington consensus³ was made between 1994 and 1998, but that thereafter virtually no further progress has been made. The nature of reforms carried out and their success will be examined in the second part of the study.

² In order to aggregate across the four dimensions of power sector reform considered in this study, a simple Power Sector Reform Index is constructed. The index gives each country a score on an interval of 0 to 100 on each dimension of power sector reform. The scores are based on giving equal weight to each step on each dimension of the reform continuum. The average of the four 0-100 scores is used to provide an overall summary of the extent of reform.

³ This refers to a set of free-market economic policies supported by prominent financial institutions such as the International Monetary Fund, the World Bank, and the U.S. Treasury, and is explained in "Rethinking Power Sector Reforms".

Figure 1: Ukraine Power Sector Reform Index

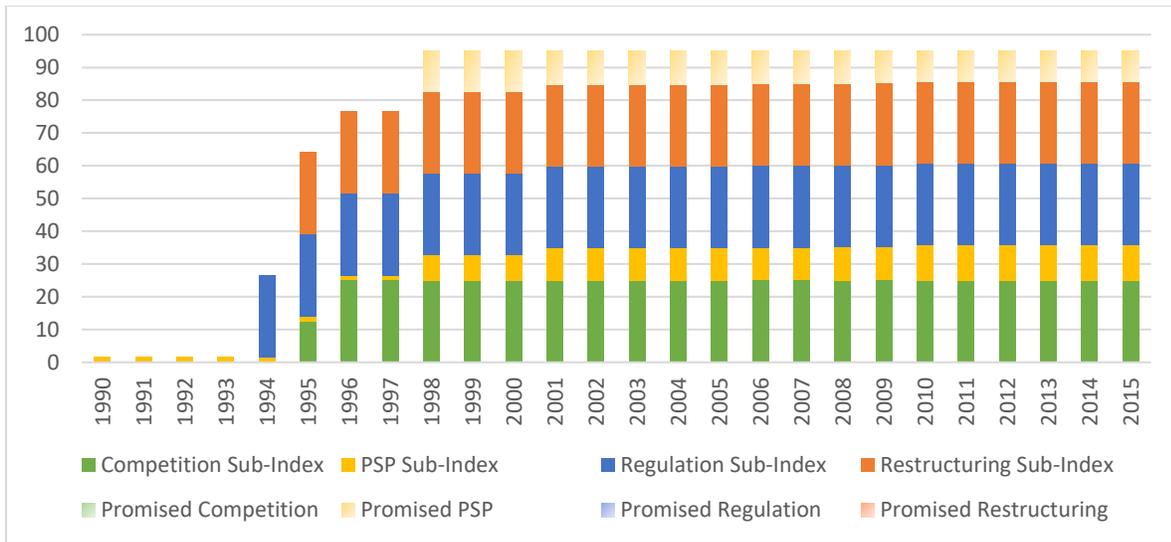
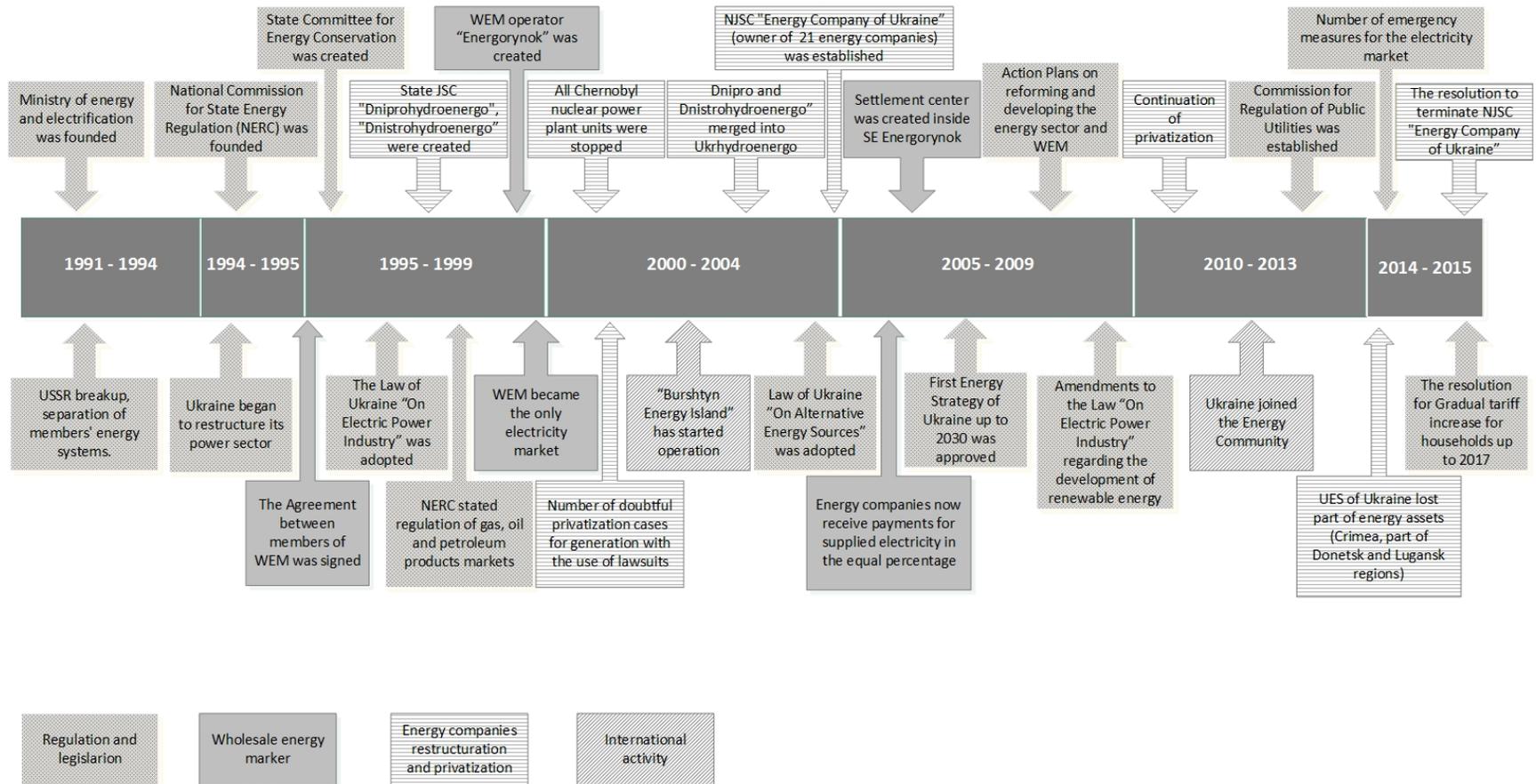


Figure 2 presents the timeline of the main reform events since 1991, separately identifying restructuring, regulation and legislation, wholesale energy market, and international energy events.

This paper, following others in the same series of country studies, sets out to explore Ukraine’s power sector reform experience, drilling down into the dynamics between sector development, performance, and key (attempted) reform interventions, with special focus on sector planning and procurement, access and accessibility, tariff setting and regulation, and utility performance. The paper begins with a detailed, chronological account of its development and reform history. From here, the paper turns to consider the performance and development of the power sector over the past decades.

Figure 2: Ukraine Power Sector Reform Timeline



2 THE DEVELOPMENT AND REFORM HISTORY OF THE POWER SECTOR

2.1 Country context and political economy

Ukraine gained independence after the collapse of the Soviet Union in 1991 and has since veered between seeking closer integration with Western Europe and being drawn into the orbit of Russia.

Shortly after independence, Ukraine named a parliamentary commission to prepare a new constitution and adopted a multi-party system. But democracy remained elusive as the legacy of state control and corruption stalled efforts on economic reform, privatization, and civil liberties. A peaceful mass protest "Orange Revolution" in late 2004 forced the authorities to overturn a questionable presidential election and to allow a new internationally monitored vote that brought Viktor Yushchenko in power. There were also clear signals that Ukraine was determined to set a different course – and quite likely in the direction of increased integration with the European Union.

Under president Yushenko a number of laws were passed that encouraged the development of the power sector towards a more competitive model but, following a regime change, little further progress was made. Ukraine's "Maidan" uprising of 2013 and 2014 resulted in the removal of pro-Russian President Viktor Yanukovich from power by Ukrainian parliament majority vote and his replacement by a new interim government in February 2014. The next few years were highlighted by political uncertainty and the Crimea crisis that have had a lasting impact on the country's political future.

As a result of the crisis, United Energy System (UES) of Ukraine lost part of its energy assets, the most important of them being thermal generation capacities, coal mines where anthracite was mined for thermal generation, and renewable energy systems (RES) in Crimea and Eastern Ukraine.

2.2 Sector Context

At independence Ukraine's power sector had virtually all households connected to the grid, had excess capacity and was able to meet demand at all times. Only in 2014-2016 with the Crimea crisis did it have to operate in state of Crisis Mode. The sector can be generally characterized as having a lack of transparency and competition based on established rules applying equally, a high level of politicization, weak national energy efficiency policy, and multiple inconsistencies in decision-making. Although the first steps toward reforming the sector have been made, and primary legislation has been enacted, implementation still lags behind, and regulation has been weak and captured. The timeline for sector reform is given in Annex B.

2.2.1 1990 – 1997: Independence leads to power sector restructuring

In the early 90s Unified Energy System (UES) of Ukraine was a part of the energy system of the USSR in the form of a vertically integrated energy complex, consisting of 8 industrial

energy unions (IEU) each with the production cycle of generation, transmission and distribution of electric and heat power for final consumers. Five nuclear power plants were separate from the energy unions, and one of these, the Chernobyl plant, had experienced a great disaster in 1986 and was closed thereafter.

Following independence, the idea of power sector reform was introduced in 1994 by President Kuchma and started in 1995-1997 when the IEU were restructured to create four regional generation companies and twenty-seven distribution companies (one in each of the twenty-five regions and an additional one in Kyiv and Sebastopol). The State Electricity Company (SEC) "Ukrelectroperedacha", which provided energy transmission from generating to distribution companies, was also created at this time. Later, "Ukrelectroperedacha" was merged with the National Dispatching Center to form the national power company "Ukrenergo" that is functional until the present.

The National Electricity Regulatory Commission (NERC) of the Ukraine had been established by presidential decree in December 1994 as an independent regulation agency responsible for regulating prices of transmission and distribution activities, issuing and monitoring licenses for sector activities, reviewing electricity market operations, promoting competition in the electricity market, and protecting consumers against monopoly abuses.

The leadership of the Ministry of Energy and Coal (MINENERGO) actively studied electricity reforms in other parts of the world.⁴ They were particularly impressed by the reform that took place in the United Kingdom in 1989-90. First, they noted the similar size and generation systems. Second, they liked the comprehensiveness of the U.K. reform, which established specialized generation companies to sell electricity through a competitive pooling arrangement, introduced a license-based regulatory system, and privatized the sector. Third, they wanted to restore Ukraine's place as a leading force in Eastern Europe's power industry.⁵ A centrally managed "gross" pool for electricity generation and distribution was a key feature of the power industry model selected by the Ukrainian government in 1994.

Producers and suppliers of electricity signed an Agreement on the creation of the wholesale electricity market (WEM) of Ukraine, with a single buyer (the WEM operator), and in 1997 the Law "On Electric Power Industry" was adopted that changed the definition of electricity to "goods" from "services" category and formalized the "pool" model as well as regulator's role.

The Ukrainian WEM determined the dispatch of all electricity generators according to their bids (subject to certain constraints) except that the electricity prices for nuclear (Energoatom) and hydro power plants were fixed by the Regulator. WEM then sold power to the oblenergoes (regional energy distributors) and to the licensed electricity traders (non-regulated tariff suppliers) at the pooled average hourly prices, including the cost of transmission and ancillary services. The oblenergoes then sold power to end consumers on

⁴ For the difference between a "gross" and a "net" pool see: www.nera.com/content/dam/nera/publications/archive1/5566.pdf

⁵ Lovei, Laszlo. 1998. *Electricity reform in Ukraine: the impact of weak governance and budget crises (English)*. Public policy for the private sector; Note no. 168. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/246101468760558042/Electricity-reform-in-Ukraine-the-impact-of-weak-governance-and-budget-crises>

the basis of retail tariffs regulated by NERC. The non-regulated tariff suppliers sold power to the large industrial consumers on the basis of unregulated negotiated prices. The market rules were embedded in the WEM Agreement. The detailed accounting was done by the dispatch center and WEM collected the payments from the oblenergoes and non-regulated tariff suppliers and paid the generating companies. Hence competition was possible only between the thermal power plants that were part of the energy generation companies—at the beginning of the “pool” operation capacity was 47% thermal (including combined heat and power), 44% nuclear, and 9% hydro.

2.2.2 1998 – 2005: Several waves of privatizations

In 1998 the first privatization of distribution and supply companies started and some of these came under the control of new owners. Privatization of distribution companies occurred in two waves—in the summer of 1998, a group of Ukrainian and offshore companies, known as the Investment Pool, purchased shares in five of the 27 regional distribution/supply companies through tender offers. In April 2001, six other distribution companies were sold for US\$ 160 million. To facilitate privatization of the six distribution companies (and to provide better incentives for cost containment), NERC and the investors agreed to a rate-of-return (ROR) pricing methodology for the newly privatized companies⁶.

Amendments to the law (“On the Electric Power Industry”) were made almost annually, in particularly making it mandatory for all WEM participants to sign electricity purchase and sale contracts with the wholesale supplier. Suppliers of electricity with regulated tariffs, as well as the wholesale supplier, opened clearing accounts in an authorized bank. The Ministry of Fuel and Energy Industry was created and the State Enterprise “Energorynok” was created as subordinate of the Cabinet of Ministers of Ukraine. “Energorynok” conducted payments to the market members using an algorithm determined by the Regulator but was not financially responsible for debts between producers and suppliers of electricity.

During the second presidential term of L. Kuchma (1999-2004), especially in the final three years, the use of privatization altered the direction of post-socialist transformation and led to exacerbation of political controversies inside the country.⁷

The initial impetus for privatization of the regional distribution power companies lay in their ownership of attractive businesses and their being primary recipients of cash flows from consumers. The state had then sought to regulate the flow through adopting amendments to the law on electricity, setting up a centralized payments scheme. At the same time weak corporate law enabled owners to effectively strongly limit the state impact on companies, even with an ownership of as low as 25%. The short lifetime of successive governments brought no prospects for normal business development.

⁶ Regulation of State-Owned and Privatized Utilities: Ukraine Electricity Distribution Company Performance. V.Berg, Chen Lin, V.Tsaplin. http://warrington.ufl.edu/centers/purc/purcdocs/papers/0401_Berg_Regulation_of_State-Owned.pdf

⁷ Conditions of Resuming and Completing Privatisation in Ukraine.0 Analytical report and recommendations for the State Privatization Program, Center for Social and Economic Research – CASE Ukraine
http://c-e-d.info/img/pdf/111_English_Full_With_Cover.pdf

It was for these reasons that the 2000-2002 period was one of the most dramatic for the power market of Ukraine. On the one hand, dubious privatizations took place, where part of generating plants was granted to the new owners by court decisions for relatively small debts, and these new powerful factions in the generation market also appeared in the distribution market (oblenergo). On the other hand, the state attempted to apply administrative instruments for forced collection and distribution of money transferred to the “pool”. At the beginning of 2002, WEM had a debt of UAH 6.3 billion to the four thermal generation companies, which, in turn, had a debt of over UAH 4.7 billion to their fuel suppliers.⁸ Fuel suppliers moved for bankruptcy proceedings against generation companies and forced the sale of assets, giving rise to the phenomenon of “asset stripping.” A state-owned gas trading company sued Donbassenergo, one of the four major thermal generation companies, for non-payment of fuel debts and the bankruptcy court ordered the company’s assets sold to settle the arrears. The auction was not publicly announced until one week after it had taken place, and at which 4,160 MW of thermal units were sold for \$38.2 million in May 2001.⁹

In 2001, trying to encourage privatization and attract strategic investors, the state sold controlling stakes of 3 DISCOs (oblenergo) to the United States AES Washington Holdings B.V. and Slovakian Vychodoslovenske Energeticke Zavody S.P, but the American investor left the market in 2013.

After 5 years of “pool” operation the issues that couldn’t be solved in the existing model had become clear—the major one being the accumulation of debts by the WEM. The performance of the newly privatized companies was not considered helpful. They failed to play by the rules of WEM or make timely and full payments to WEM. It is believed that they contributed to the continuation of the non-payment problems by accepting non-cash payments and by not acting against delinquent customers. Seven of the privatized companies had an accumulated debt of UAH 2.9 billion.

2.2.3 2006 – present: Second generation reforms

Considering its own as well as European experience of electric power market organization, the government in 2002 approved the “Concept of Wholesale Electricity Market of Ukraine” for operation and development. According to the Concept, it was anticipated to introduce a full-scale competitive market with direct bilateral agreements for the purchase and sale of electricity and a balancing market, gradually transitioning from the current model with further liberalization of relations between generators, suppliers and consumers of electricity. The development of the new market model continued for almost 7 years, with the participation of international experts and donor organizations.

In 2003 two hydro energy companies, “Dniprohydroenergo” and “Dnistrhydroenergo”, were merged into “Ukrhydroenergo”. In 2004 the government united all state energy assets (apart

⁸ At the same time, the overall debt of WEM to all generators (including hydro and nuclear) amounted to UAH 13.3 billion and the generators’ debts to their creditors amounted to UAH 15.6 billion

⁹ Venkataraman Krishnaswamy Gary Stuggins “Private Sector Participation in the Power Sector in Europe and Central Asia”. P. 114, WB, 2003.

<https://openknowledge.worldbank.org/bitstream/handle/10986/15123/265160PAPER0Pr1rticipation0in0power.pdf?sequence=1&isAllowed=y>

from nuclear power plants) into a National joint-stock company the “Energy Company of Ukraine” (ECU). The authorized fund consisted of the shares of 4 generating companies, 15 DISCOs (oblenergo) and the hydro plant (“Ukrhydroenergo”). The ECU continued operation for 10 years but was liquidated in 2014 and the shares in the state-owned enterprises returned to the State Property Fund or to the control of Ministry of Energy and Coal Industry.

Taking into consideration that transition to the new model was impossible without solving the issue of debts and financial imbalance, in 2005 the Parliament amended the law to allow mutual settlements between market members and some consumers. This amended law has been in power until now.

In 2006 the Cabinet of Ministers of Ukraine approved the first Energy Strategy of Ukraine, covering the period up to 2030. For the next 10 years it prioritized nuclear as well as coal generation, and renewable energy received incentives for development. A revised version of the Energy Strategy of Ukraine "Safety, Energy Efficiency, Competitiveness", covering up to 2035, was approved by the Cabinet of Ministers in August 2017.

By 2009 drafts of the laws on energy market and on a new regulator had been developed, as well as a number of regulatory acts and rules for the new market. However, after the change of President from V.Yuschenko to V. Yanukovich, the energy market did not experience any substantial changes during next 4 years. The only decisive move was to amend the Law “On Electric Power Industry” to establish preferences for the new power plants using renewables in form of feed-in-tariffs. Further amendments to the Law “On Electric Power Industry” were adopted, according to which access to the cross-border transmission capacity of Ukraine’s interstate power grids for electricity export is provided at the auction terms, on condition of available transfer capacity of Ukraine’s interstate power grids. In practice only the State Foreign Trade Company (Ukrinterenergo) took advantage of these benefits.

The market continued operation as a “pool”, but in 2010 Ukraine joined the Energy Community and committed to reform the energy market according to requirements of the 2nd and 3rd EU Energy Packages. The aim of EU is to make the energy market fully effective and to create a single EU gas and electricity market, with the objectives of keeping prices as low as possible and increasing standards of service and security of supply.

The Second Energy Market Package requires electricity and gas markets to be open for consumers to choose suppliers. The third Package consists of two Directives, one concerning common rules for the internal market in gas (2009/73/EC) and one concerning common rules for the internal market in electricity 2009/72/EC), and three Regulations, one on conditions for access to the natural gas transmission networks ((EC) No 715/2009), one on conditions for access to the network for cross-border exchange of electricity ((EC) No 714/2009) and one on the establishment of the Agency for the Cooperation of Energy Regulators ACER ((EC) No 713/2009).

The new law of Ukraine "About the principles of electricity market operation" came into effect on 1 January 2014 having been adopted in October 2013. The main purpose of the law is to liberalize the wholesale electricity market in Ukraine because of the obligations of Energy Community membership. Although the law is generally considered as a positive step forward,

it does not sufficiently incorporate the relevant *EU acquis*. In 2016 a new Energy Market law that takes into account the requirements of the 3rd EU Energy Package passed the first reading in Parliament. On 13 April 2017, the Parliament of Ukraine adopted the Law “On the Electricity Market of Ukraine” (hereinafter – the Electricity Market Law).

On August 27, 2014, President Poroshenko abolished the NERC and established the National Commission for State Regulation of Energy and Utilities (NEURC) as a subordinate body under the President and Verkhovna Rada (Parliament) by integrating the authorities and functions of the NERC. The NEURC regulates the energy sector, including electricity, heat, oil, gas and coal as well as public services, including water and sewerage, waste management, recycling, etc. In September 2016, the Law "On the National Commission for State Regulation of Energy and Utilities" was adopted by the Verkhovna Rada. Adoption of this specific law was key to ensure the full independence of the NEURC, a precondition for the compliance with the EU Third Energy Package.

During 2014 Ukraine underwent major changes including the Crimea crisis, political changes with Presidential elections held in May and Parliamentary pre-term elections in October 2014. As a result of the crisis, UES of Ukraine lost part of its energy assets, most important being thermal generation capacity, coal mines where anthracite was mined for thermal generation, and RES in Crimea. During 2014-2015 the government of Ukraine several times approved resolutions on the implementation of an emergency state in the energy sector that resulted in manual management of money distribution on the market and interference into power stations’ work schedule.

In 2014-2015, as part of the long-term goal of integration with the EU, progress was made with the implementation of a feasibility study on the synchronous interconnection of Ukrainian and Moldovan power systems to ENTSO-E Continental European Power System, and after signing the Association Agreement with EU work started on the transition to the new market model according to requirements of the 3rd Energy Package.

In 2015 NEURC introduced an incentive related tariff for distribution companies, constructed on regulatory asset base (RAB). A gradual increase of electricity tariffs in order to reduce subsidization took place, and renewable capacities increased. Introducing a market-based energy price is an effective policy measure on both supply and demand sides. For the supply side, energy companies can secure financial resources for investment in new infrastructure if tariffs reach cost-recovery levels, while for the demand side, consumers are encouraged to save energy. National and international experts have repeatedly noted the importance of raising Ukraine’s domestic energy prices in accordance with market prices. Substantial price increases took place in 2015, but with the collapse of the currency, these price increases did not entirely cover the import level price, and further price increases in gas and electricity were required in 2016 and 2017.

The 2013 law "About the principles of electricity market operation" was followed by the “On the Electricity Market of Ukraine” law in 2017. This law has as its goal a step-by-step liberalization of the energy market in line with the so-called 3rd Energy Package of the

European Union¹⁰. The new market is expected to start on July 1, 2019 and will contain sub-markets for: (1) bilateral contracts; (2) a day-ahead market; (3) an intraday market; (4) a balancing market; (5) a market for ancillary services; and (6) retail market. This law is a major breakthrough, introducing principles of fair competition and nondiscriminatory participation, equal rights to buy and sell, free choice for consumers to select power suppliers, third party access to transmission and distribution grids, and price and tariff setting that reflect actual costs. The challenges to the Ukrainian electricity sector remain daunting: the internal power sector debt was \$1.04 billion¹¹, and the independence of the regulator will be of central importance. Without this the electricity market will remain under heavy political influence and will not perform for the benefit of society as a whole.

¹⁰ Ukraine: Electricity Market liberalized to meet the EU 3rd Energy Package requirements. www.cms-lawnow.com/ealerts/2017/04/ukraine-electricity-market.

¹¹ Reforming Ukraine's Energy sector: Critical Unfinished Business. Antonenko, Nitsovyh, Pavlenko and Takac. 2018. carnegieeurope.eu/2018/02/06/reforming-ukraine-s-energy-sector-critical-unfinished-business-pub-75449

3 SECTOR PERFORMANCE

This section considers the performance of the power sector in Ukraine and relates this, where relevant, to the reform policies that have been adopted. The system has been characterized by inefficiency and poor decision making, while the political events of 2014 had made the issue of energy independence of greatly increased importance. The desire to harmonize with EU policies suddenly gave a major thrust to those actions that would bring about private ownership and competition within the sector.

At the time of independence in 1991 the power sector consisted of 8 vertically integrated state-owned power unions (IEU) and 5 separate nuclear plants. These were soon unbundled into 4 regional generation and 27 distribution companies, but this “big bang” reform did not involve ownership separation, but only legal separation. Some limited privatization took place in the early post-independence years, but issues of corruption brought this to a halt. Later administrations restarted the process, and private ownership has increased particularly in the most recent years.

The extensive experience of reform of the restructured sector is considered under four headings: energy security, access and affordability, efficiency and cost recovery, and financial viability. For each of these categories quantitative and qualitative measures of performance are discussed and comparisons with other countries are made. Assessments are made for the whole sector, and at a utility level for the 70% state-owned DISCO Khmel'nitskoblenergo (Kbno), and for the majority privatized DISCO Dniprobenergo (25% state ownership).

For the analysis of national (sector) institutional aspects of performance, comparators are provided by the case of Tajikistan (as a country that had also attained independence and at the same time), and by Columbia, Peru, and Philippines as examples of countries in the sample that are the most advanced in the reform process. The average of all fifteen countries included in the other studies (referred to as “International Benchmark”) includes both advanced reforming countries and those that have made little progress in reforming the sector.

Performance of the sector during this period is first measured with a qualitative assessment of the steps taken towards restructuring and privatization:

- Utilities where unbundling involves ownership separation receive the highest scores while utilities where unbundling involves just functional separation receive the lowest. Both horizontal and vertical unbundling are scored separately for each area of operation—generation, distribution and transmission. The restructuring score is the average of vertical and horizontal unbundling.
- The privatization (PSP) scores are based on World Bank’s PPI database. Each economy is scored on the basis on the number of projects that have been privatized (divested) in the sector. Full divestiture receives a higher score as compared to partial divestiture. The tabulated scores for generation, transmission and distribution are then multiplied by the respective share of the private sector in each of the operational areas. This gives individual scores for PSP in generation, distribution and transmission. The scores are averaged to get to the PSP score.

Table 1 shows that unbundling, both horizontally and vertically, is slightly more advanced in Ukraine than in the International Benchmark, while Tajikistan has not done any unbundling and Philippines has attained a maximum score. In terms of privatization Ukraine is more advanced with respect to distribution but has a very low figure for generation, where it lags far behind the most advanced countries. In 2016, the state owned 25% or more shares in 11 DISCOs, and had over 75% shareholding in three of the seven GENCOs.

Table 1: Restructuring and Privatization Performance Indicators

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International benchmark
Utility Restructuring	35%	73%	100%	0%	63%	45%
Vertical Unbundling	70%	80%	100%	0%	60%	55%
Horizontal Unbundling	0%	67%	100%	0%	67%	34%
Pvt sector participation	49%	61%	62%	6%	30%	24%
PSP in Generation	63%	78%	84%	15%	13%	41%
PSP in Distribution	35%	19%	39%	3%	52%	16%
PSP in Transmission	50%	88%	66%	0%	25%	14%

Source: Data collected for the Rethinking Power Sector Reform project

3.1 Energy Security

Energy security in terms of capacity was not a major concern for Ukraine until the events of 2014. Total capacity was 53.7 GW in 1991, and 56.4 GW in 2014 while figures reported by the Ukrainian Wind Energy Association¹² in 2018 showed capacity in 2017 of 55.7 GW. However, if one were to exclude the capacity that was lost due to the Crimea crisis, the capacity in 2017 was 51.8 GW. These figures indicate that there was little growth of capacity during the period, and that about 10% of capacity was lost. During the period 2005 – 2014, peak demand fluctuated around 30 GW, indicating that there was at all times surplus capacity. Electricity consumption per capita decreased during this period, largely due to increased energy efficiency (Figure 3). Ukraine still exports electricity, although this has been in decline in recent years.

¹² Ukrainian Wind Power Sector 2017: Market Overview. 2018, Ukrainian Wind Energy Association. www.uwea.com.ua

Figure 3: Electricity consumption per capita(kWh)

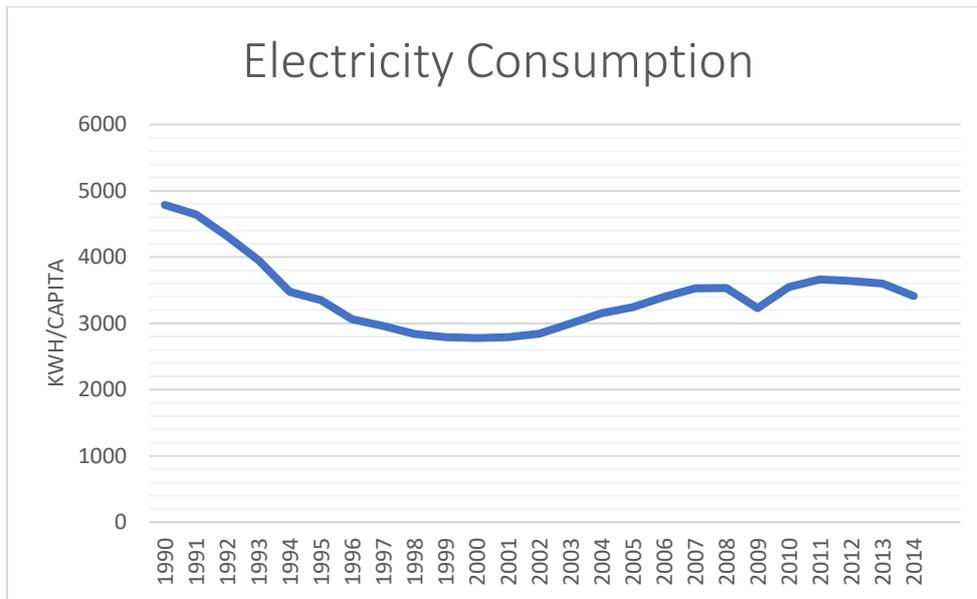
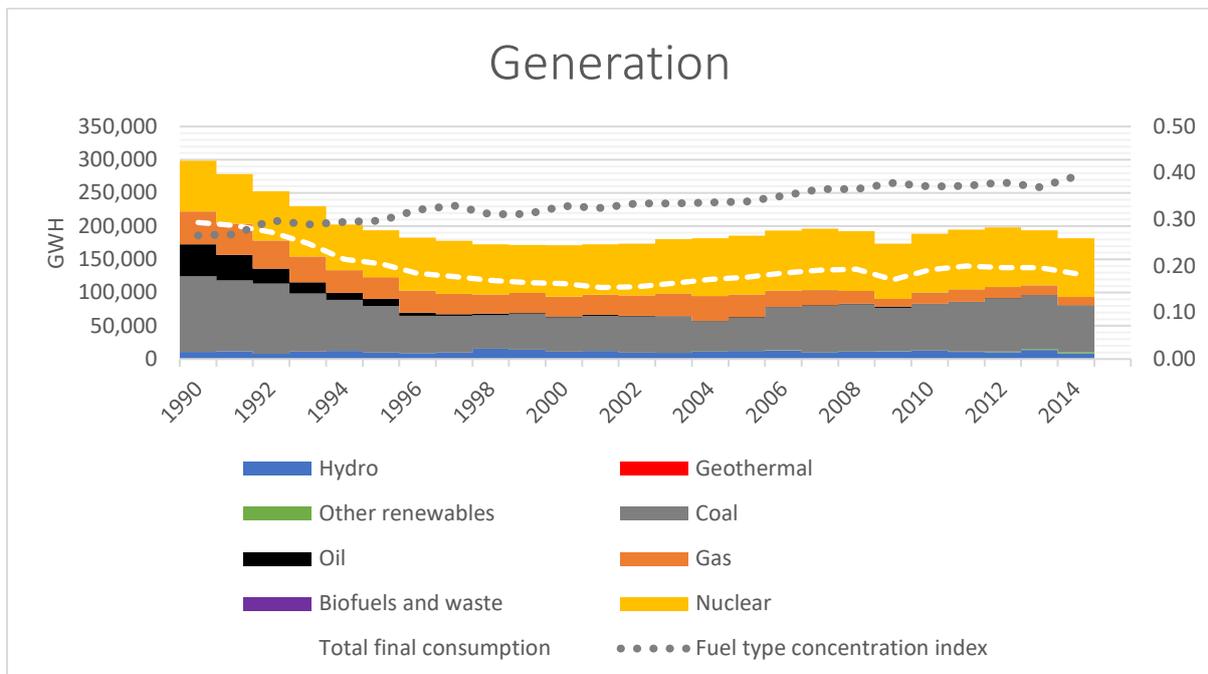


Figure 4 shows the generation (in GWh) by fuel type and the fuel concentration index. As consumption fell the use of coal has increased, oil has been almost completely phased out, and gas has declined. Nuclear has remained almost constant, while hydro and renewables are negligible. As a result, the concentration index has risen steadily from 0.25 at the beginning of the period, to 0.4 in 2014.

Figure 4: Generation by fuel type (GWH) and fuel concentration index



Security of supply can also be judged by load shedding and outages experienced. In 2013 the World Bank’s Enterprise Survey indicated that there were few outages but that these were widely felt. For the Europe and Central Asia region outages were more burdensome (Table 2).

Table 2: Reliability of Electricity Supply

Indicator	Ukraine	Europe and Central Asia
% of firms experiencing outages	23.2	31.9
Number of outages per month	0.3	1.5
Average duration of outage (hours)	3.1	3.4
Average sales lost to outages for those experiencing outages %	2.0	2.3
% owning generators	8.8	17.2
% of electricity from generators for those owning a generator	23.0	10.0

Source: World Bank Enterprise Survey

Institutional evaluation of sector planning and procurement

NEC Ukrenergo (the transmission system operator) is tasked with planning for both generation and transmission—there is a 10 -year transmission plan, but no generation master plan. There is also a strategy with the objective to link up with the pan-European network (ENTSO-E)¹³. The evaluation of generation and transmission planning is shown in Table 3. Ukraine has a low overall score on planning and procurement because of the very low scores achieved by procurement of generation and transmission¹⁴. On planning for generation and for transmission Ukraine scores at the level of the international benchmark, well below levels for some of the most advanced reforming countries, but the procurement scores are exceptionally low, indicating a substantial weakness with respect to this aspect of sector management (see Annex table A1). The large amount of excess generation capacity has so far meant that little new capacity has been required, and that the weak procurement structure has so far been of little importance.

¹³ In June 2017 UkrEnergo signed an agreement on the conditions of the future unification of the energy systems of Ukraine and Moldova with ENTSO-E. In July 2017, the agreement came into force after it had been signed by the necessary number of European electricity transmission system operators. Further on Ukraine and Moldova in April 2018 signed a memorandum on cooperation and joint actions between the two countries' relevant ministries aimed at ensuring European integration processes to achieve the synchronous operation of the power grids of Ukraine and Moldova with ENTSO-E. Now work on Integration of Moldova and Ukraine Transmission Systems with ENTSO-E is progressing and World Bank is providing financial support to do a Dynamic and Steady State Analysis. The deadline for Ukraine's fulfilling the requirements for accession to the united energy system of continental Europe is July 2022.

¹⁴ The qualitative performance tables are based on replies to a number of questions on various aspects of the variable under consideration. Tables showing the complete range of questions, the “yes” or “no” answers, and the scores obtained by weighting these answers together are shown in Appendix 1. These scores are grouped by sub-headings of the main aspects of the variable in question, and the weighted average of the sub-heading and the overall average are shown in summary tables in the main text.

Table 3: Performance of sector planning and procurement

	Columbia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Planning and procurement	95%	77%	59%	64%	38%	70%
Generation planning	86%	43%	71%	71%	60%	56%
Generation Procurement	95%	90%	100%	100%	0%	85%
Transmission planning	100%	75%	50%	50%	75%	72%
Transmission procurement	100%	100%	17%	33%	17%	64%

Source: Data compiled for Rethinking Power Sector Reform project

3.2 Access and affordability

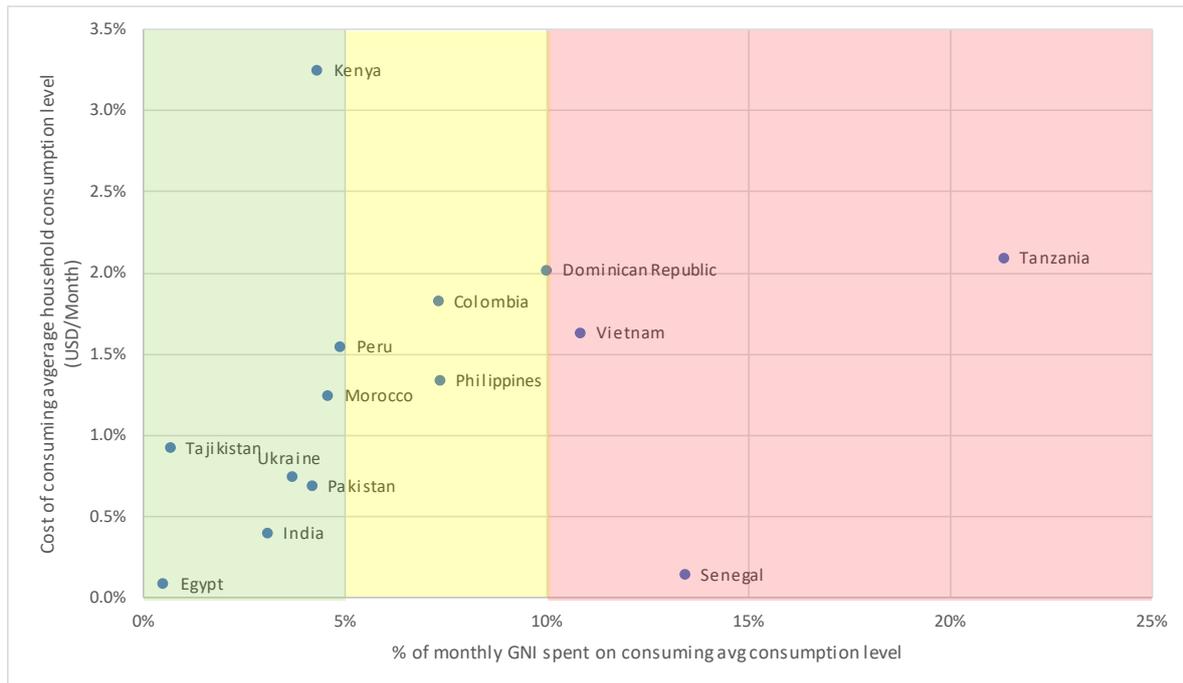
Access

There has been almost universal access in the Ukraine for many years and it is unnecessary to make an evaluation of this aspect of performance which in other countries studied is related to new connections, and mini grids.

Affordability

In terms of affordability the comparative measure of performance shows that average household consumption of electricity in 2017 was 171 kWh per month, which would have cost US\$ 56.7 per annum. Households in the bottom 40% of Gross National Income had an income US\$ 1529, so that to purchase the national average consumption of electricity these households would have had to spend 4.6% of their income. Figure 5 indicates that Ukraine is amongst the countries with the lowest cost of purchasing the average household consumption, even after the recent price rises, and this also means that the share of income of these households needed to purchase the average consumption is amongst the lowest group of countries.

Figure 5: Cost of Purchasing average household consumption (US\$ × 10) and % of income of lower 40% of population needed to purchase average household consumption in 2017



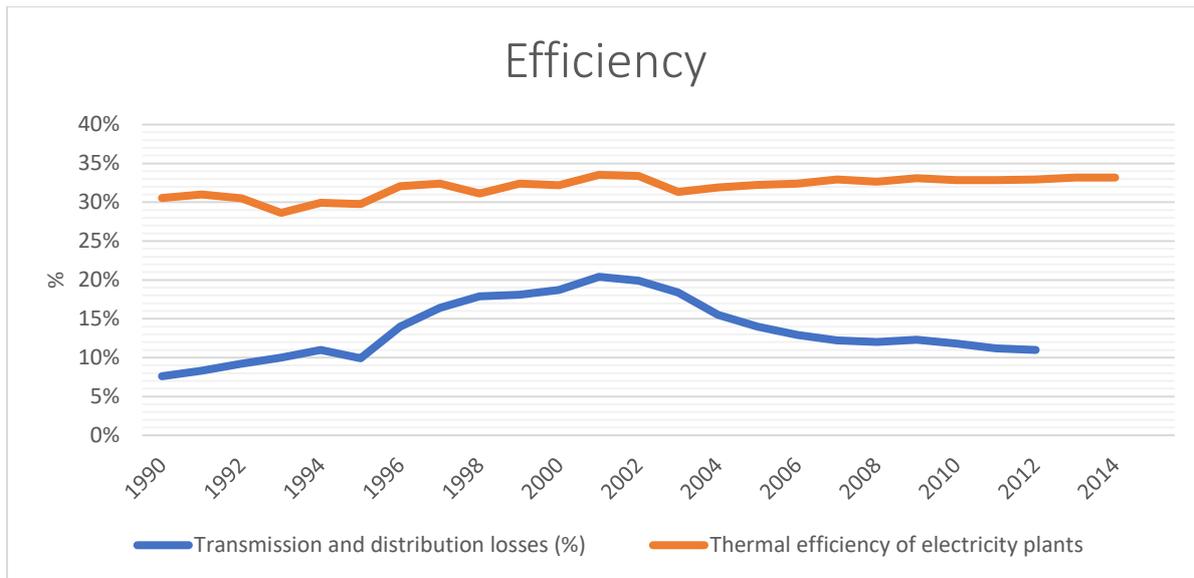
3.3 Operational and commercial efficiency

The operational efficiency of the power system as a whole is measured by the thermal efficiency of the generating plants and by transmission and distribution losses. As shown in Figure 6, thermal efficiency has slowly increased over the last twenty years, but is still at a level where further improvements should be sought¹⁵. Transmission and distribution losses increased sharply between 1990 and 2002, reaching 20% at their peak. Thereafter they have declined to around 10% at the end of the period, reflecting both the increased privatization and the impact of regulation¹⁶.

¹⁵ In the past 5 years from 2014 Ukraine Thermal Power Sector has reconstructed/upgraded 13 Thermal Units to more efficient ones higher efficiency and consumption of G grade coal instead of anthracite which is not accessible

¹⁶ Transmission losses have decreased in last 10 years as IBRD/EIB/EBRD/KfW and Ukrenergo are putting significant funds into rehabilitation/automation and reconstruction of Power Lines. On the other hand Discos have increased losses as they are not financing reconstruction and their facilities are deteriorating.

Figure 6: Thermal efficiency and transmission and distribution losses



To assess performance at utility level, two Ukrainian DISCOs have been examined as representing the broad patterns of performance at the utility level. Kbn0 is majority state owned, while Dniproblenergo is Ukraine’s largest distribution company, supplying electricity to over 40,000 industries and 1.5 million households—the energy it supplies amounts to 20% of the entire consumption in Ukraine. The majority of Dniproblenergo has been privatized, with 52% owned by DTEK; and 25% still owned by the Government of Ukraine. The DISCO was privatized in 2012, so the utility’s performance with respect to the reforms in Ukraine can be analyzed for the pre (2001-2011) and post (2012-2016) privatization periods. It has mostly industrial consumers while Kbn0 has mostly residential, agriculture and small business consumers.

For the qualitative indicators of performance these two Ukrainian utilities are also compared to utilities in those countries chosen for country level comparison: Columbia (EPM, CODENSA); Peru (Luz del Sur, HIDRANDINA); Philippines (MERALCO, BENECO); and Tajikistan (Barki Tojik).

The distribution plus collection losses for Kbn0 are shown in Figure 7. Initially the revenue losses were very high at around 14% but have since been reduced to under 6%. The distribution loss is still very high at around 18%, while the collection rate is now in the range 98.5-100%. The decision of the new regulator NEURC to introduce tariffs based on regulatory assets base in 2015 can be seen clearly in the rising average tariff measured in local currency. However, the utility’s net profit margin is hardly impacted given the massive devaluation shock that the local currency has gone through since 2014, which meant that the tariff declined in dollar terms.

Figure 7 Distribution losses and collection losses for Kbn0

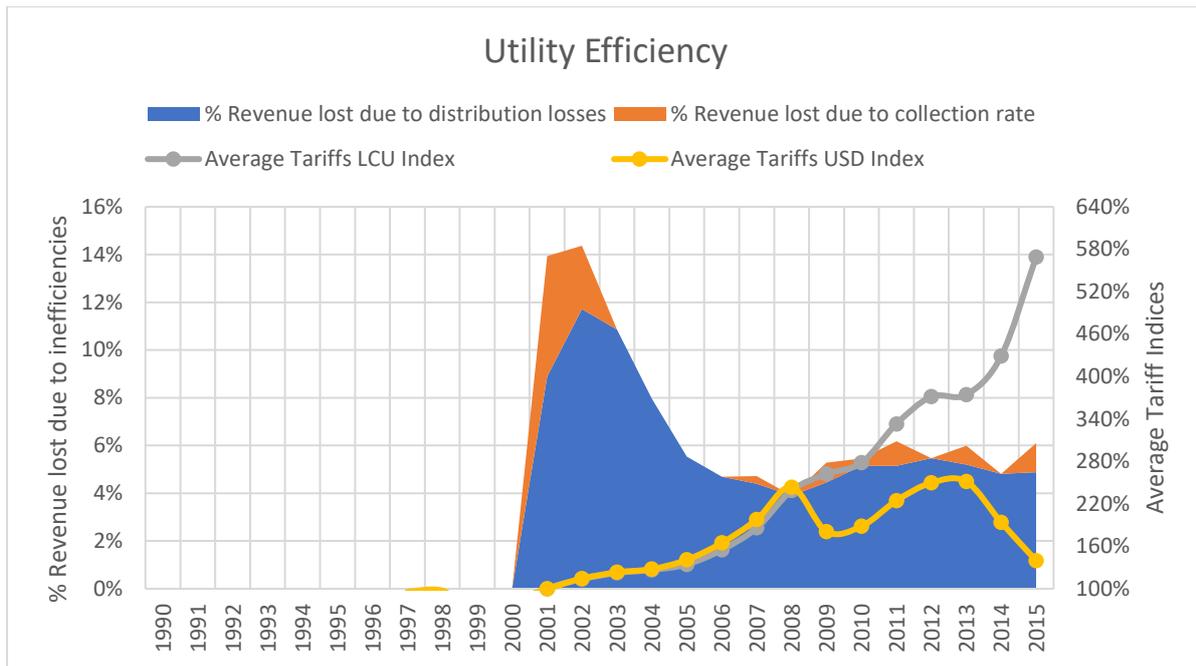
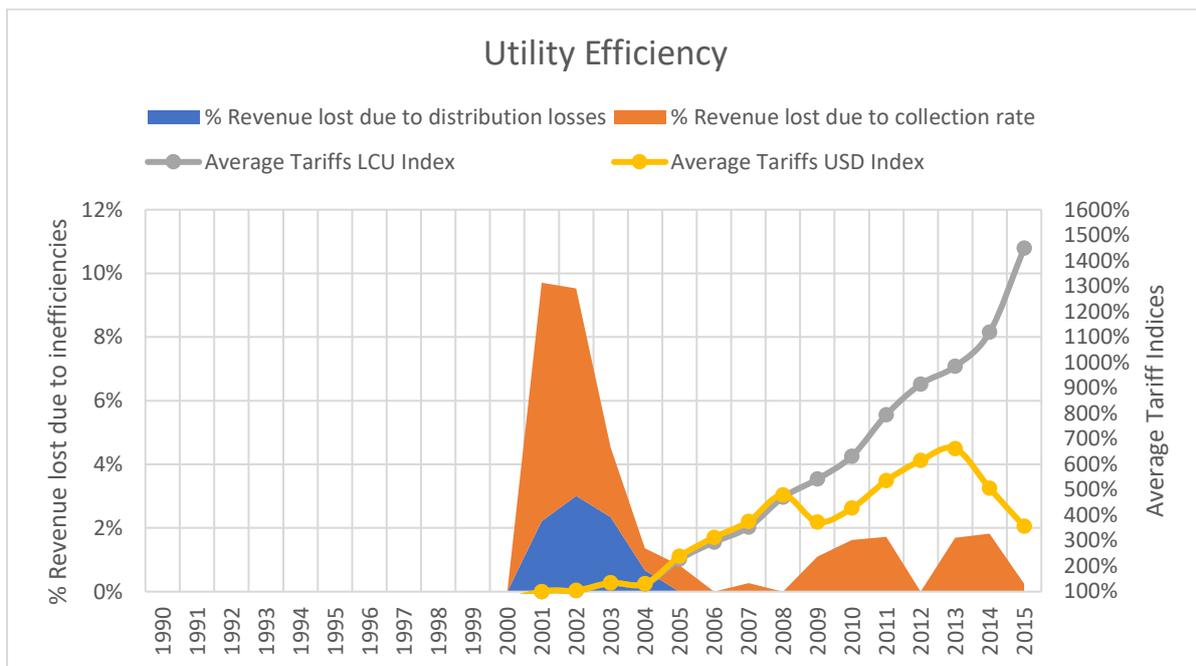


Figure 8 shows that for Dniproenergo because of low bill collection and high distribution losses revenue losses were initially very high, but rapidly reduced to around 2%. The distribution losses have remained below 7%, and the collection rate rose sharply to around 98%. Notably, post 2004 there has been no perceptible difference in these performance indicators for the periods under public and private ownership

Figure 8: Distribution losses and collection losses for Dniproenergo



Evaluation of institutional policies towards operational and commercial efficiency

Table 4 provides a summary of corporate governance performance for the various utilities included in the study. The corporate governance score is the average of the scores on accountability and autonomy, which themselves are averages of scores on individual sub-components (shown in Annex table A2). Similarly, the score on utility management is the average of scores on financial discipline, human resources, and information and technology (Annex table A3). The score for overall utility governance is the average of the scores on corporate governance and utility management.

The scores of the two Ukrainian utilities on overall governance are well above the international benchmark, but below the better performing utilities from three of the most reforming countries (Colombia, Peru, and Philippines). On the sub-component of corporate governance, the picture is similar with the Ukraine's score pulled down by weaker performance of Dniproenergo on the sub-component of accountability where this is below the international benchmark. On autonomy the Ukraine's score are among the highest, but the coupling of high autonomy with weak accountability is indicative of the problems that the Ukraine has experienced.

On utility management, the Ukrainian utilities both score slightly higher than the international benchmark but are below the best performing utilities in the sample. This picture is reflected in all three of the sub-components—financial discipline, human resources, and information technology. Notably, the score on Human resources for Kbnno is well below that for Dniproenergo, whereas Kbnno is equal or better on all other indicators.

Table 4: Headline Utility Governance Performance

	Tajikistan	Peru		Colombia		Philippines		Ukraine		International Benchmark
	Barki Tojik	Luz del Sur	Hidrandina	EPM	CODENSA	MERALCO	BENECO	Kbno	Dniprobl energo	
Overall Utility Governance	52%	85%	55%	80%	69%	90%	76%	75%	72%	63%
Corporate Governance	42%	85%	40%	76%	96%	100%	83%	82%	69%	62%
<i>Accountability</i>	17%	92%	58%	75%	92%	100%	67%	75%	50%	60%
<i>Autonomy</i>	67%	78%	22%	78%	100%	100%	100%	89%	89%	63%
Utility Management	62%	85%	70%	83%	43%	81%	68%	67%	74%	64%
<i>Financial Discipline</i>	64%	86%	65%	76%	69%	71%	53%	64%	65%	59%
<i>Human Resource</i>	57%	90%	71%	86%	60%	79%	86%	57%	79%	62%
<i>Information and Technology</i>	64%	80%	73%	87%	0%	93%	67%	80%	80%	71%

Source: Data compiled for Rethinking Power Sector Reform project

3.4 Cost Recovery and Financial Viability

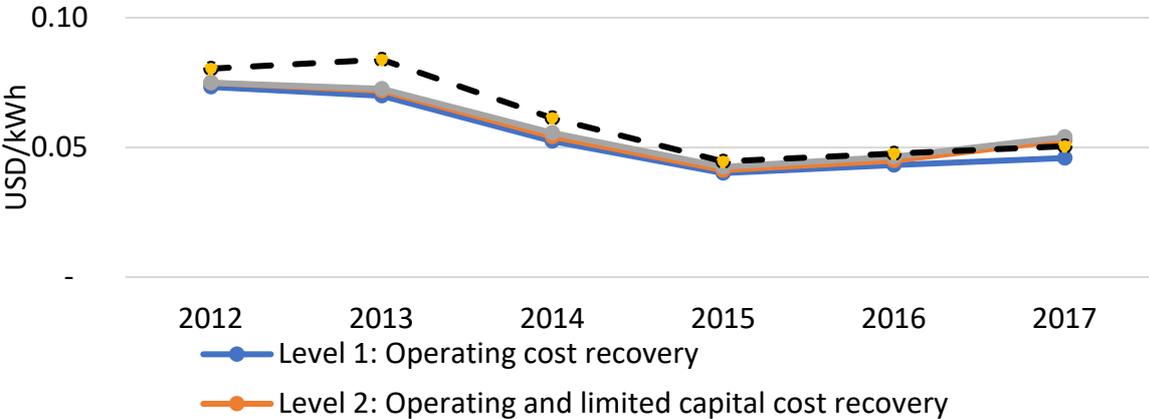
This analysis focuses on two of Ukraine’s 27 distribution companies Kbno and Dniproblenergo. The cost of service analysis is based broadly on Ukraine’s Wholesale Electricity Market (WEM), established in 1996, since more detailed information was not available to do an analysis of the specific distribution companies.

Khmelnyskoblenenergo’s distribution losses have declined from their peak of 28.6 percent in 2002 to 18.0 percent in 2015. Dniproblenergo performs much better in terms of losses, which were 5.95 percent in 2015 (and were below the target of 7 percent even before privatization). Khmelnyskoblenenergo’s collection rate was 98.71 percent in 2015 but had exceeded 100 percent in previous years. Dniproblenergo’s collection rate was 99.75 percent in 2015 and had also exceeded 100 percent in previous years.

Average tariff revenue is compared to three different cost levels—level 1 (operating cost recovery), level 2 (operating and limited capital cost recovery) and level 3 (full cost recovery of current and future costs). Figure 9 shows that WEM average electricity revenues for domestic sales exceeded level 3 full cost recovery of current and future costs (excluding any fiscal costs) in 2012-2016 but slipped below level 2 or level 3 cost recovery in 2017 and only covered operating cost.

In 2015, the National Commission for State Regulation of Energy and Public Utilities introduced cost-of-service tariffs based on an estimate of a utility’s regulatory asset base. The regulator has increased tariffs twice, but the increases did not keep up with the increase in costs.

Figure 9: Average Tariff Revenue versus Financial Viability



Looking at the source of revenues versus the share of sales it can be seen that residential consumption is heavily cross-subsidized by other customer groups. Consumption from residential customers far outweighs the share of revenues from those customers: Dniproblenergo’s residential customers made up 15 percent of consumption and only 5 percent of revenues, while Khmelnyskoblenenergo’s residential customers made up 52 percent of consumption and only 19 percent of revenues. Figure 10 shows the average tariff revenue for each customer class compared to cost-recovery levels A1-A3. Figure 11 compares the percent of consumption for each customer class to the percent of revenue from that class.

Figure 10: Average Tariff Revenue by customer type versus Cost-Recovery Levels

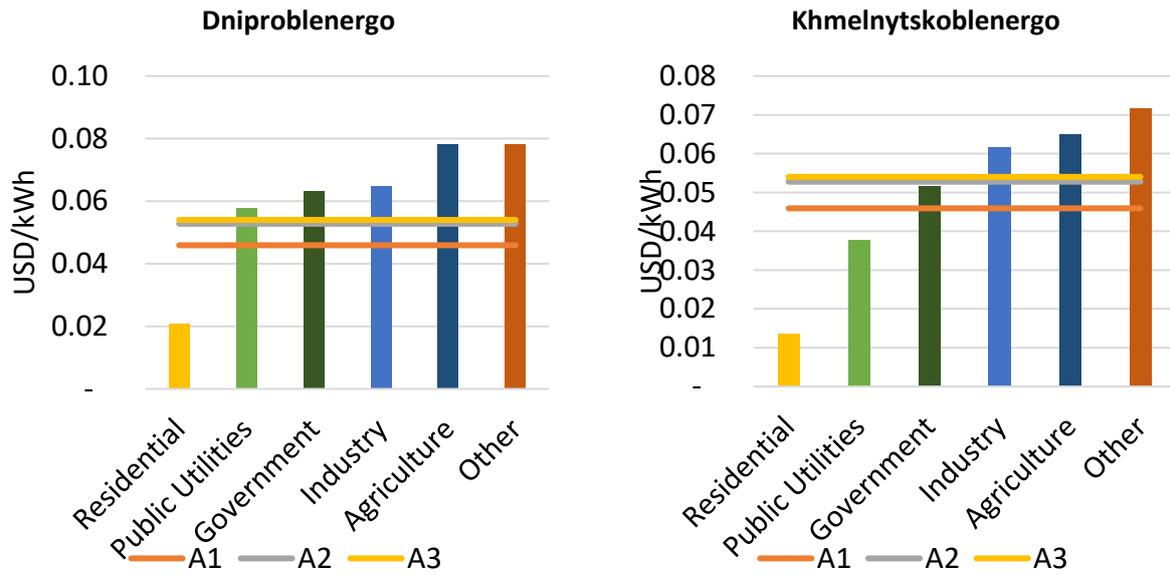
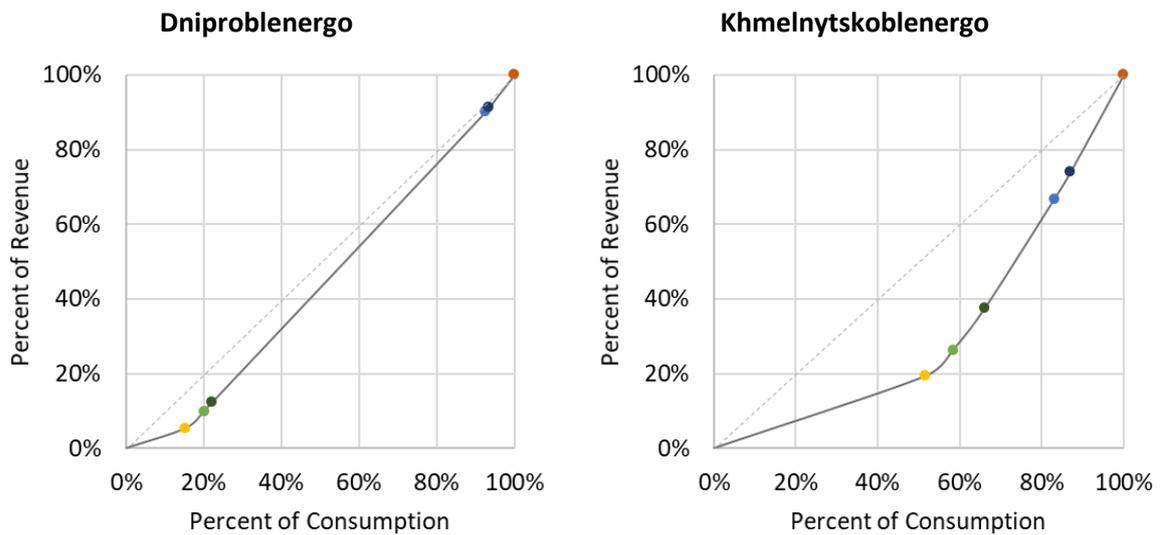


Figure 11: Percent of Revenue versus Percent of Consumption



Estimates of the financial performance of these two utilities have been made that show the net profit margin and the debt-to-equity ratio. Figure 12 shows the financial performance of Kbno, and Figure 13 that for Dniprobenergo.

Figure 12: Financial performance of Kbn

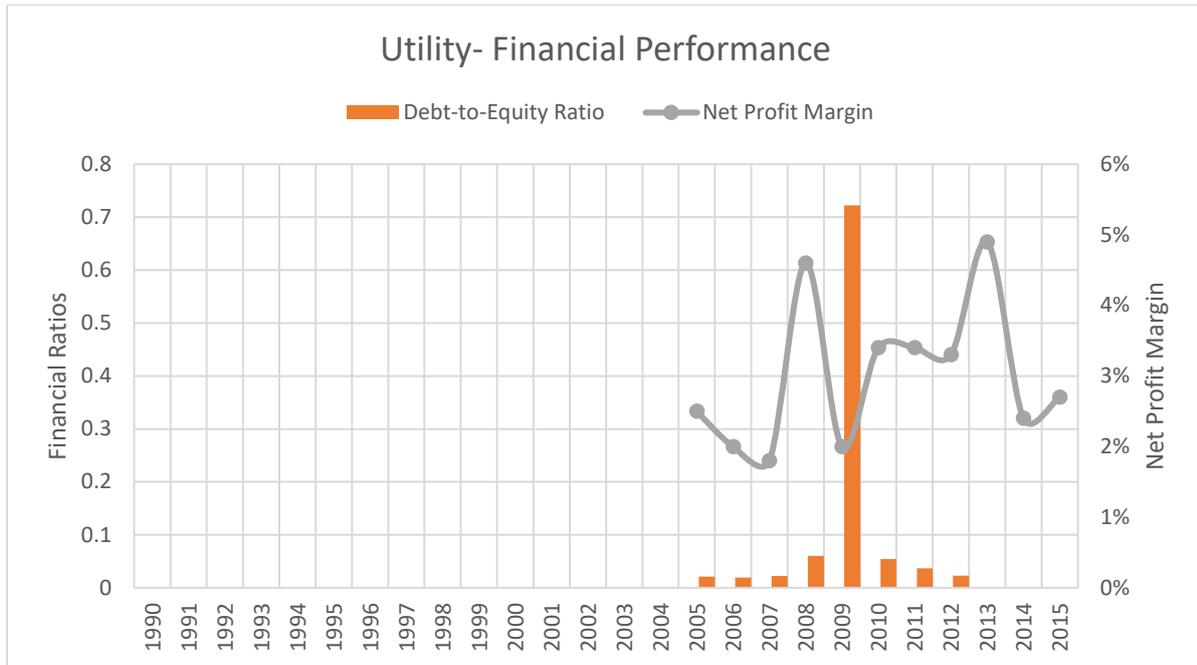
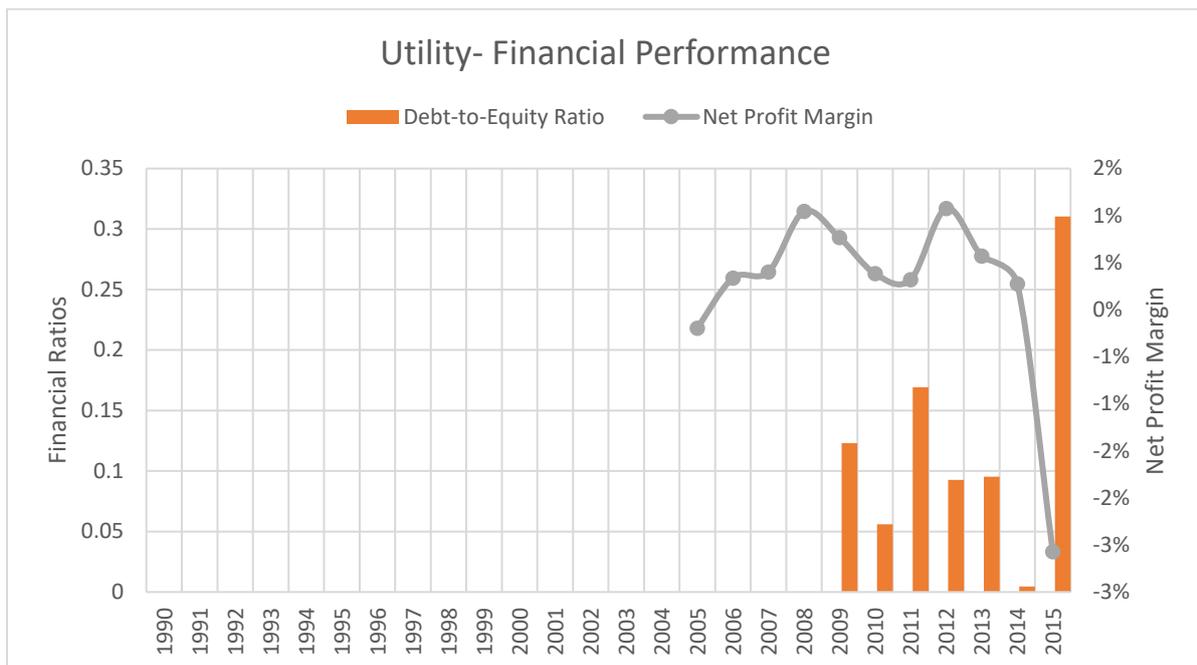


Figure 13: Financial performance of Dniproenergo



3.4.1 Institutions

The Regulator (NERC) was first created in 1994, following the reorganization of the energy system post-U.S.S.R. In 2011 it was reorganized, and the National Commission for State Regulation of Public Utilities was created. These two bodies were merged in 2014 to become the National Commission for State Regulation of Energy and Public Enterprises (NEURC)¹⁷.

¹⁷ A review of the regulatory authority is given in: "The National Energy Regulatory Authority of Ukraine: Governance and Independence. Energy Community Secretariat Review March 2018

The performance of the regulatory system for the sector is evaluated from two standpoints. First, an evaluation is made of the de jure performance by comparing the laws, rules, and regulations in place with various criteria that would be desirable in an ideal system. Second, a de facto evaluation incorporates actual behavior. An overall performance index is constructed by taking averages of the different sub-components. The performance of the regulatory system is firstly evaluated for 2015 in line with the rest of this report but, in the light of an important law concerning regulation that was passed subsequent to this date, the summary indices for regulatory performance in 2019 for both de jure and de facto standpoints are included at the end of the section on regulation.

Performance of regulation is assessed by: regulatory governance, represented by accountability and autonomy aspects (Table 5); and regulatory substance, represented by tariff regulation, quality regulation and market-entry regulation (Table 6). Scores for these indicators are built up from lower level indicators and in turn from questions asked for each of these indicators. Detailed results of this process are shown in Tables A.4 in the Appendix. Comparators are three countries which have taken substantial reform steps, and Tajikistan.¹⁸

3.4.2 Regulatory governance

Table 5 presents the values for the aggregate indices for regulatory governance built up from the questions and responses shown in Appendix Table A4. Ukraine’s overall score of 57% is close to the International Benchmark (59%) and slightly above Columbia (45%) and Philippines (48%), while it is far above the value for Tajikistan (24%) and far below the value for Peru (83%).

Making an overall comparison with Peru, the country with the highest scoring de jure index, of the components of Regulatory Governance, the Accountability scores were almost equal, and it was on Autonomy that the big difference occurred, and further inspection reveals that the difference in scores for managerial autonomy is largely the cause, with Ukraine having a zero score and Peru the maximum score.

Table 5: Formal regulatory governance in Ukraine and comparators, 2015*

Indicators	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Regulatory Governance	45%	83%	48%	24%	57%	59%
Accountability	75%	85%	95%	69%	84%	83%
Regulatory Oversight	67%	67%	100%	67%	67%	81%
Legal Appeals	100%	100%	100%	100%	100%	100%
Transparency	57%	89%	85%	40%	85%	67%
Autonomy	60%	98%	51%	35%	68%	71%
Decision-Making Autonomy	64%	92%	79%	60%	86%	79%
Budgetary Autonomy	88%	100%	50%	50%	100%	80%
Leadership Autonomy	88%	100%	75%	29%	88%	66%
Managerial Autonomy	0%	100%	0%	0%	0%	59%

Source: Data compiled for Rethinking Power Sector Reform project

* For detailed regulatory tables see Annex tables 4.

¹⁸The detailed reasons for using different averaging methods for different groups of indicators or indices are explained in ?? ref. Arithmetic means are used for groups of indicators that are basically independent of each other, while products are used where indicators cover similar topics.

3.4.2.1 Accountability

As regards **regulatory oversight** NEURC is required to annually report on its activities and the use of funds to the Verkhovna Rada (Parliament). Independent, nongovernmental evaluations of regulator's performance, however, have not taken place. Article 24 on "openness of Regulator's activity" states that the regulator must hold open hearings for decision making processes; inform the public about the plans and results of its work; ensure access to information and provide information upon request; and publish on its official website information such as its meeting agenda, its draft decisions (along with the justification), the adopted decisions, an annual report on its work, the quarterly results of market monitoring in the areas of energy and utilities, the project and the approved budget, among others. For **legal appeals** on the regulator's decisions, draft decisions must be published on the regulator's website, with the purpose of receiving comments and suggestions from other bodies. The article also states the time frame within which this publication must be made and what it must include. With regard to **transparency**, there is non-government stakeholder participation in all regulator's decision-making processes, nevertheless it is not mandatory for all of them. this participation is legally required only in decision-making processes pertaining wholesale prices, quality of service, licensing, and utility oversight. Final decisions have to be made public within five working days from the date of their acceptance on the official website of the regulator.

In summary, NEURC's performance in this aspect of de jure regulatory governance is very good (84% as an average of its performance in Regulatory Oversight, 67%; Legal Appeals, 100%; and Transparency, 85%). Its main weaknesses in this regard are the fact that there have not been independent, non-governmental evaluations of the regulator's performance, and that some decision-making processes do not require the participation of nongovernmental stakeholders; this is particularly relevant in the case of decision-making processes related to end-user tariffs determination.

3.4.2.2 Autonomy

NEURC is in charge of granting licenses for electricity generation, transmission, distribution, and supply; of determining end-user tariffs; of regulating quality of supply and services, prices or terms of Power Purchase Agreements (PPA), competitive procurement; and of utilities oversight. It exerts an advisory role regarding market design issues. As regards regulator's **decision-making** autonomy, the Regulator Law specifically states that, in the performance of its functions and powers the regulator acts independently of any other body of state authority, which may make its capture by oligarchs easier. Moreover, it states that the regulator's decisions shall not be subject to approval by the public authorities (except in cases provided by the legislation on the protection of economic competition). In the areas where the regulator exerts an advisory role, whenever it makes a recommendation to a government body and the latter decides to reject or modify it, it must provide a public explanation for doing so.

Its **funding** is established by law and is entirely composed by levies or license fees from regulated companies. The regulator's draft budget shall be published annually on its official website (and be subject to open discussion) and be then approved by the Parliament Budget Committee.

As regards **leadership** autonomy, the regulator’s leadership is structured as a multi-member commission with full -time membership. It is composed of seven members elected by the President from among a public ranking prepared by a selection commission. This selection commission, in turn, must include two members nominated by the President, two members nominated by the Parliament, and one person nominated by the Cabinet of Ministers. The Regulator’s leadership, which has the status of civil servants, is in office for 6 years (renewable once), and its chairman is elected every two years through secret vote by the Commission’s members. There are specific requirements for being eligible as a commission member, which are stated in the Regulator Law. The Regulator’s leadership can be removed from office ahead of schedule by Presidential decree under conditions given in the Regulator Law. Finally, it shall be pointed out that regulator members are banned from having any employment or other contractual relationship with any entity operating in the energy and/or utility sectors within two years from the date of termination of their duties in the NEURC.

Finally, as regards **managerial** autonomy, there are legal provisions linking the pay scale of the regulatory entity to public sector pay and as mentioned before, the regulator is required to follow the employment regulations that are applicable to the civil service. Nevertheless, it is explicitly stated in the Regulator law that the remuneration of Regulator members shall provide sufficient material conditions for the independent performance of their official duties and to encourage diligent work.

Summing up, NEURC de jure autonomy is good (68%). The main de jure limitation is, in the area of Decision-making Autonomy, that it only has an advisory role on market design issues. As regards Leadership Autonomy, the regulator cannot freely allocate its budget, which must be approved by the Parliament. Finally, as regards Managerial Autonomy, there are legal provisions linking the regulator’s pay scale to public sector pay and it must follow the employment regulations that are applicable to the civil service.

3.4.3 Regulatory substance

Table 6 presents the values for the aggregate indices for regulatory substance built up from the questions and responses shown in Appendix Table A4. Ukraine’s overall score of 75% is close to the International Benchmark (76%), to Columbia (81%) and Peru (83%), while it is far above the value for Tajikistan (46%) but below the value for Philippines (95%).

Table 6: Formal regulatory substance in Ukraine and Comparators, 2015

Indicators	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Regulatory Substance	81%	83%	95%	46%	75%	76%
Tariff Regulation	92%	100%	93%	29%	83%	77%
<i>Framework for Tariffs</i>	100%	100%	86%	33%	100%	90%
<i>Determination of Tariffs</i>	83%	100%	100%	25%	67%	64%
Quality Regulation	100%	100%	92%	43%	92%	75%
<i>Quality of Service Standards</i>	100%	100%	100%	36%	100%	82%
<i>Quality of Service Enforcement</i>	100%	100%	83%	50%	83%	68%
Market Entry Regulation	50%	50%	100%	67%	50%	77%
<i>Permitting New Entrants</i>	50%	100%	100%	100%	100%	90%
<i>PPA Approvals</i>	50%	0%	100%	33%	0%	57%

Source: Data compiled for Rethinking Power Sector Reform project

3.4.3.1 *Tariff regulation*

As regards the **regulatory framework** for tariffs, there exists an explicit policy regarding the objectives to be pursued in the determination of end-user power tariff—these objectives are cost recovery, efficiency, equity, and fairness. NEURC has authority over tariff level, structure, and over the frequency of tariff revisions. The regulatory framework provides a definition of cost recovery and it includes operating costs, full cash needs, and depreciation charges. With respect to **tariff determination**, there is a written formula that prescribes how end-user tariff levels are to be set, it is publicly available, and the regulator must adhere to it. Tariff-setting is based on the notion that inefficiencies will gradually be phased out and, as regards to costs from a previous tariff control period, these are partially carried over and incorporated in the next tariff determination. End-user tariff-setting regulations incorporate incentives to improve efficiency, using benchmark parameters related to transmission losses, distribution losses, the collection ratio, and fuel purchase price. Finally, there are regulatory mechanisms to compensate generators for the provision of firm capacity or ancillary services, but utilities are not compensated for the costs of stranded assets.

NEURC's score on de jure aspects of tariff regulation is very good (83%, being the average of Regulatory Framework for Tariffs, 100%; and Determination of Tariffs, 67%). The main de jure limitation facing the tariff determination is the fact that, according to the survey, end-user tariff-setting regulations do not avoid passing-through inefficient costs to customers and utilities are not compensated for the costs of stranded assets.

3.4.3.2 *Quality Regulation*

As regards quality regulation, there are specific quality of **service standards** formally written and publicly available for quality of product, supply, and commercial service; these standards are revised every 10 years. Fines for noncompliance are enforced in practice and whenever a utility fails to meet the standards, this is disclosed to the public. The revenues from the penalties accrue to affected users. As regards quality of **service enforcement**, regulated entities are required to periodically report on indicators, such as SAIDI, SAIFI, and voltage indicators; but these are not independently validated by the regulator. Utilities are required to use automated information management systems to measure the quality or reliability of the power supply and these measurements are publicly available. Also, formal measurements of overall customer satisfaction are legally required, and these are undertaken through customer surveys carried by utilities and also by a specialized state department.

Summing up, there is a comprehensive quality regulatory framework, with specific and publicly available requirements of information processes and consequences of noncompliance. NEURC's performance on quality regulation is very good (92%), the only weakness being the fact that it does not independently review or validate any technical performance data.

3.4.3.3 *Market Entry Regulation*

As regards the **permitting of new entrants**, there are licenses available to carry out activities in the production, transmission, distribution of electricity, electricity supply, trader activities, as well as for the function of market operator. The licensing conditions for carrying out these activities and monitoring compliance with them is carried out by the NEURC. The regulator can also impose sanctions for non-compliance. There is a legally established period in which NEURC must approve or refuse an application solely on the grounds provided by law and in

a non-discriminatory manner. Also, in case of refusal, the regulator must inform the applicant of the reasons for this.

As regards **PPA approvals**, the regulatory agency is not legally required to approve PPAs or other sales contracts between IPPs and utilities, nor does it have authority over the process by which utilities procure power from the IPPs, but this is a non-issue when all generation is sold to the pool.

3.4.4 Overall assessment of performance of regulation

Table 7 summarizes Ukraine's regulatory performance in 2015 and 2019 of de jure aspects, which describe what is stated in the law and regulatory framework, and de facto aspects which try to capture experts' comments and perceptions of the actual performance of the various aspects of regulation. The 2015 date was selected because it is the general termination date for the analysis in this report but, following the passage of an important regulatory law, the performance in 2019 better indicates the performance of the regulatory system.

The overall de jure score for regulation of 43% in 2015 is moderate and compares with scores of 47% for the international benchmark, 36% for Columbia, 70% for Peru, 56 % for the Philippines, and 11% for Tajikistan. The poorer than average performance of Autonomy as part of regulatory governance has a substantial effect on the overall regulatory score. However, following the passing of the new regulatory law, by 2019 the de facto and de jure values of the overall regulatory score in Ukraine had increased by significant amounts – with the regulatory governance component showing the largest increase. In both years the de facto assessment by experts is close to the de facto score suggesting that within the structure imposed by the rules, the operation of the regulatory system is working as intended.

Table 7: Overall de jure and de facto scores for regulation

Indicators	2015		2019	
	De jure	Perceived	De Jure	Perceived
Overall regulation	43	43	56	52
Regulatory Governance	57	57	72	72
Accountability	84	84	100	100
Regulatory Oversight	67	67	100	100
Legal Appeals	100	100	100	100
Transparency	85	85	100	100
Autonomy	68	68	72	72
Decision-Making	86	86	100	100
Autonomy				
Budgetary Autonomy	100	100	100	100
Leadership Autonomy	88	88	88	88
Managerial Autonomy	0	0	0	0
Regulatory Substance	75	75	78	72
Tariff Regulation	83	83	75	75
Regulatory Framework for Tariffs	100	100	100	100
Determination of Tariffs	67	67	50	50
Quality Regulation	92	92	92	75
Quality of Service Standards	100	100	100	100
Quality of Service Enforcement	83	83	83	50
Market Entry Regulation	50	50	67	67
Permitting New Entrants	100	100	100	100
PPA Approvals	0	0	33	33

Source: Data compiled for Rethinking Power Sector Reform project

4 CONCLUSION

The problem facing Ukraine after independence in 1991 was how to transform a monolithic state-run power sector into a more efficient and competitive system that could be consistent with eventual EU membership. A series of steps were taken in this direction—there was some unbundling of the sector; there was limited privatization; a regulator was established; and a wholesale power market was created.

There has been some improvement in efficiency but there is still room for improvement, and Ukraine has not yet fully implemented those steps needed to fully satisfy the crucial 2nd and 3rd EU directives. Only after the Crimea crisis and its impact on the power sector has there been any real urgency in pursuing sector reform.

A summary of performance and institutions for the main aspects of a reform agenda (security of supply, access and affordability, operational and commercial efficiency, cost recovery and financial viability, and regulation) is presented below and in Table 8.

Security of supply has not been a concern until recently, with the inherited system having excess capacity even at times of peak demand. The issue has been instead the low level of efficiency of this system. Over time as older plant is retired and new plant is added under competitive conditions efficiency can be expected to increase. Of more concern recently has been the security of supply of fuels, particularly gas from Russia, and coal where the country has limited access to high quality anthracite mines. Linking to the EU power system is expected to improve the overall security. The reliability of the system has been reasonable, with relatively few outages, although these outages have had an average duration of 3 hours, similar to that of the Eastern Europe and Central Asia group of countries.

On **access**, the performance has been very good throughout the period. Ukraine has had almost universal access throughout the period and there has been a slow but steady trend to achieving a 100% rate.

Affordability has not been a problem. Households in the bottom 40% of Gross National Income would have had to spend 4.6% of their income to achieve average household consumption of electricity. This figures places Ukraine among the group of countries where power is most affordable. One reason why households face highly affordable tariffs is because of heavy cross-subsidies from other users, especially agriculture.

On **operational and commercial efficiency**, the performance of the distribution utilities has been mixed. The majority state-owned Kbrno reduced overall revenue losses due to T&D losses and collection losses from 14% to 6%, but the distribution loss of around 18% is still very high. For the majority privately owned Dniproenergo overall revenue losses declined to around 2%, while distribution losses remained below 7% and collection rates rose to around 98%. However, there was no difference in these losses between the immediate pre- and the post-privatization periods.

Tariffs and cost recovery have been impacted by the actions of the new regulator (NEURC) post 2015 which made the decision to relate tariffs to regulatory base assets. This resulted in a large increase in tariffs measured in local currency, but the large-scale devaluation that occurred at the same time left the profit margins virtually unchanged. Average revenues exceeded full cost recovery during the period 2012 -2016, but in 2017 they covered only

operating costs, because the regulator did not increase tariffs enough to keep up with cost increases.

Table 8: Summary evaluation of Ukraine's power sector reform efforts

	Performance	Institutions
Security of supply	The excess capacity inherited at independence has ensured that security of supply has been adequate. Concerns about security of fuel supply have recently accelerated the drive to link to the EU.	There is a 10-year transmission plan, but no generation master plan. The strategy of linking to the plan - European network has been developed and the necessary legislation drafted and passed.
Access & affordability	Throughout the period access has been almost universal. Affordability has not been a problem despite the inefficiencies still remaining in the system; the use of heavy cross subsidies has meant that the lowest income group has not had to devote excess income to purchasing electricity.	With universal access regulation is not required to increase the level of access
Efficiency and financial viability	T&D loss have been reduced but are still high. This more especially notable for the mainly state-owned DISCO analyzed. Collection rates have improved are now near 100%. The thermal efficiency of generation has slightly improved, and more can be expected as plant is retired and replaced.	The initial sector reforms did not provide effective incentives to improve performance or for supply to respond to competitive pressures. Changes in regulation linked to the attempt to bring the system into line with EU directives may result in improved efficiency
Tariffs and cost recovery	Tariffs have been mainly determined by the government. Even the large increases in domestic tariffs enacted in 2015 turned out to be inadequate because of the parallel massive devaluation.	The regulatory framework is generally adequate with the major limitations being the lack of mechanisms to compensate utilities for stranded costs, and the passing through of inefficient costs.

The experience of Ukraine points to some important lessons for the adoption of a reform program to improve the delivery of energy services in other countries.

First, partial implementation of the reform structure may achieve little in the improvement of sector performance. In Ukraine, soon after independence the sector was unbundled both vertically and horizontally, there was limited privatization, and a gross pool for trading electricity when the single buyer model was introduced. These initial steps of a well-designed reform program did not yield the benefits expected of a full reform program for a number of reasons. The privatizations were limited in number and scope and were carried out for political gain rather than to achieve a more competitive environment. The rules of the pool allowed companies to accumulate debts, and this led to fuel suppliers suing generators.

Asset stripping then occurred as a result of politically biased state intervention. This required urgent actions including passing law on debt settlement mechanism, which partially resolved situation but left some companies getting bankrupt along the process. Unbundling by itself did not result in an improvement in the efficiency of the state-owned companies. Without a more competitive structure, where companies had stronger incentives to improve performance, the partial reform did not deliver the gains that might have been expected.

Second, privatization needs to be carried out according to a well-defined, consistent, and transparent procedure. Without these conditions, assets can fall into the hands of those who have no interest in taking part in a competitive market but rather are interested in gaming the system for short term returns. The so-called “shadow privatizations” resulted in oligarchs obtaining a large degree of control over distribution.

Third, the introduction of a complete reform program is likely to require several years of active and consistent support from the government. The nature of the reform program is that it requires a sequence of steps—unbundling, privatization, the introduction of an independent regulator and the associated legislation, and the introduction of a competitive market mechanism. Each of these steps requires planning and legislation, and governments may be tempted to try short-cuts which leave the resulting system ineffective. If, as happened in Ukraine, there are a series of short-lived governments then complex legislation is hard to finalize, and little progress may result. Unless there is common target for all the major political players, changes of government may see a slow-down in the execution or even the abandonment of the reform program.

Fourth, the implementation of a comprehensive and effective reform program may require a “seismic” shock to the system. Ukraine had from the early days of independence made moves towards adopting a market based competitive supply model compatible with EU practice, liberalize tariffs, create bilateral mechanisms, but between 1991 and 2014 limited progress toward implementing this goal had actually been achieved. Following the Crimea crisis, the desire to strengthen links with the EU, and to improve the security of supply of power, led to the introduction of laws to allow the system to transition to a market model based on the requirements of the 3rd Energy Package through signing the EU-Ukraine Association Agreement and agreement on an action plan to implement 3rd Energy package and ECS agreements.

APPENDIX A: DETAILED TABLES OF SECTOR AND UTILITY PERFORMANCE

Table A1: System Planning and Procurement

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International benchamrck
Planning and Procurement	95%	77%	59%	64%	38%	70%
Generation Planning	86%	43%	71%	71%	60%	56%
Country has a generation master plan	○	○	○	○	●	94%
Country has an overall energy plan	○	○	○	○	○	65%
Competent entity is responsible for producing the plan	○	●	○	○	○	88%
Inter-governmental committee oversees the planning unit	○	●	○	○	●	29%
Power generation system plan is mandatory	●	●	●	●	NAP	19%
Plan leads to timely initiation of procurement	○	●	●	●	NAP	38%
Planning process is transparent and participatory	○	○	○	○	○	59%
Transmission Planning	100%	75%	50%	50%	75%	72%
Competent entity is responsible for producing the plan	○	○	○	○	○	100%
Explicitly linked to power generation plans	○	●	○	○	○	88%
Plan is mandatory	○	○	●	●	●	29%
Planning process is transparent and participatory	○	○	●	●	○	71%

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International benchamrck
Procurement of Generation	95%	90%	100%	100%	0%	85%
There is a framework for procurement	○	○	○	○	●	82%
Country allows International competitive bidding or public auctions	○	○	○	○	●	94%
Types of procurement methods allowed						
<i>Unsolicited bids</i>	○	●	●	●	●	29%
<i>Direct negotiation</i>	○	●	●	○	●	47%
<i>International competitive tendering</i>	●	○	○	○	●	88%
<i>Public auctions</i>	○	○	●	●	●	41%
<i>Stand-alone capacity market</i>	●	●	●	●	●	0%
Auction design score	0.86	0.71	NAP	NAP	NAP	80%
Country uses public auctions for procurement	○	○	●	●	●	41%
Clear and comprehensive established rules	○	○	NAP	NAP	NAP	100%
Credible penalties for violating the rules	○	○	NAP	NAP	NAP	86%
Guarantees and penalties to ensure timely completion	○	○	NAP	NAP	NAP	86%
Standard, non-negotiable contracts	○	○	NAP	NAP	NAP	86%
Stapled financing terms or risk mitigation instruments	○	●	NAP	NAP	NAP	86%
No concerns regarding the transparency and fairness of the auction	●	●	NAP	NAP	NAP	14%
Efforts to inform and attract bidders to the auction	○	○	NAP	NAP	NAP	100%
Transmission Procurement	100%	100%	17%	33%	17%	64%
There is a framework for procurement of new transmission lines	○	○	●	●	●	59%
Methods used to procure new transmission-	○	○	●	●	●	69%
<i>Competitive tender</i>	○	○	●	●	●	65%
<i>Direct negotiation</i>	●	●	●	○	●	24%
All projects are awarded to the incumbent transmission company	●	●	○	●	○	47%

Table A.2: Utility Level Corporate Governance- Accountability and Autonomy

	Colombia		Peru		Philippines		Tajikistan	Ukraine		International Benchmark
	EPM	CODENSA	Luz del Sur	Hidrandina	MERALCO	BENECO	Barki Tojik	Khmelnitskoblenergo	Dniproblenergo	
Corporate Governance	76%	96%	85%	40%	100%	83%	42%	82%	69%	62%
Accountability	75%	92%	92%	58%	100%	67%	17%	75%	50%	60%
Private or public shareholders appoint board	●	○	○	○	○	○	●	○	●	36%
Transparent process exists for Board selection	●	○	○	●	○	○	●	●	●	36%
Board members cannot be removed at will	●	○	○	●	○	●	●	○	○	29%
Chairperson & CEO are separate positions	○	○	○	○	○	○	○	○	○	75%
Function of Company Secretary exists	○	○	○	○	○	○	●	○	●	82%
Board Sub-Committees for different issues	○	○	●	●	○	●	●	●	○	68%
Audit committee of the Board	○	○	○	○	○	○	●	○	●	71%
Board Code of Conduct exists	○	○	○	○	○	○	●	○	●	64%
Requirement to declare conflicts of interest	○	○	○	○	○	○	●	○	○	75%
Utility has carried out any third party transactions in last five y	○	●	○	●	○	●	●	●	○	46%
Minority shareholders' rights are protected	○	○	○	●	○	●	●	○	●	39%
Utility publishes an Annual Report	○	○	○	○	○	○	○	○	○	93%

	Colombia		Peru		Philippines		Tajikistan	Ukraine		International Benchmark
	EPM	CODENSA	Luz del Sur	Hidrandina	MERALCO	BENECO	Barki Tojik	Khmelnitskoblenergo	Dniproblenergo	
Corporate Governance										
Autonomy (SOEs)	78%	100%	78%	22%	100%	100%	67%	89%	89%	63%
Board is the final body to take decision on-										
<i>Defining corporate strategy</i>	○	○	○	●	○	○	○	○	○	96%
<i>Approving business plans</i>	○	○	○	●	○	○	○	○	○	96%
<i>Setting and monitoring performing objectives</i>	○	○	○	○	○	○	○	○	○	92%
<i>Selecting, appointing and overseeing the CEO</i>	○	○	○	●	○	○	●	○	○	56%
<i>Raising capital from debt</i>	○	○	○	●	○	○	○	○	○	68%
<i>Raising capital from equity</i>	●	○	○	●	○	○	○	○	○	48%
<i>Major capital expenditures</i>	○	○	○	●	○	○	○	●	○	88%
<i>Deciding and implementing tariff adjustments</i>	●	○	●	●	○	○	●	○	●	24%
<i>Human resource hiring and firing decisions</i>	○	○	●	○	○	○	●	○	○	72%

Table A3: Utility Level Management- Financial Discipline, Human Resources, and Information and Technology

	Colombia		Peru		Philippines		Tajikistan	Ukraine		International Benchmark
	EPM	CODENSA	Luz del Sur	Hidrandina	MERALCO	BENECO	Barki Tojik	Khmelnitskoblenergo	Dniproblenergo	
Utility Management	83%	43%	85%	70%	81%	68%	62%	67%	74%	64%
Financial Discipline	76%	69%	86%	65%	71%	53%	64%	64%	65%	59%
Utility has a credit rating	○	○	○	●	○	●	○	●	●	36%
Utility can issue new bonds	○	○	○	●	●	●	●	●	○	36%
Utility can issue new equity	●	NAV	○	●	○	●	●	●	○	26%
Utility pays dividends to shareholders	○	○	○	●	○	●	●	○	○	29%
Public service obligations are explicitly defined	○	○	●	○	○	○	●	●	○	46%
PSO is publicly disclosed	●	●	NAP	○	○	○	NAP	NAP	●	38%
PSOs are costed	●	●	NAP	●	●	●	NAP	NAP	●	0%
PSOs are compensated by government	●	●	NAP	●	●	●	NAP	NAP	●	0%
Utility required to meet financial performance targets	○	○	○	○	●	●	●	○	○	52%
System of internal financial controls exists	○	●	○	○	○	○	○	○	○	96%
Internal audit function exists	○	●	○	○	○	○	○	○	●	93%
Utility is subject to state auditing procedures	○	○	●	○	●	●	○	○	○	71%
Financial accounts are produced	○	○	○	○	○	○	○	○	○	96%
Financial accounts are audited by external auditor	○	○	○	○	○	○	○	○	○	93%
Financial accounts are publicly disclosed	○	○	○	○	○	○	○	○	○	79%
Financial accounts meet national standards	○	○	○	○	○	○	○	●	●	82%
Financial accounts meet international standards	○	○	○	○	○	○	○	○	○	57%

	Colombia		Peru		Philippines		Tajikistan	Ukraine		International Benchmark
	EPM	CODENSA	Luz del Sur	Hidrandina	MERALCO	BENECO	Barki Tojik	Khmelnitskoblenergo	Dniproblenergo	
Utility Management	86%	60%	90%	71%	79%	86%	57%	57%	79%	62%
Human Resource	86%	60%	90%	71%	79%	86%	57%	57%	79%	62%
Annual staff performance reviews exist	○	NAV	○	○	○	○	●	○	○	93%
Employees receive performance related bonuses	●	NAV	○	○	○	○	○	○	○	70%
Employees can be fired for poor performance	○	○	○	○	○	○	○	○	○	79%
Government employment regulation don't apply	●	NAV	○	●	○	○	●	●	○	26%
Wages not based on government pay scales	○	NAV	○	●	○	○	●	●	○	48%
Staff training policy exists	○	○	○	○	○	○	○	○	○	86%
Managers are free to hire employees	○	●	NAV	●	●	●	○	●	○	12%
Managers are free to fire employees	○	●	NAV	●	●	●	○	○	○	24%
Managers can execute budget	○	●	NAV	○	○	○	●	○	●	60%
Managers can implement investment projects	○	●	NAV	○	●	○	●	●	●	44%
Recruitment involves advertisement of positions	○	○	●	○	○	○	○	●	●	71%
Recruitment involves short-listing candidates	○	○	○	○	○	○	○	○	○	89%
Recruitment involves interviewing candidates	○	○	○	○	○	○	○	●	○	82%
Recruitment involves reference checks	○	○	○	○	○	○	●	○	○	75%

Utility Management	Colombia		Peru		Philippines		Tajikistan	Ukraine		International Benchmark
	EPM	CODENSA	Luz del Sur	Hidrandina	MERALCO	BENECO	Barki Tojik	Khmelnitskoblenergo	Dniproblenergo	
Information and Technology	87%	0%	80%	73%	93%	67%	64%	80%	80%	71%
SCADA system	○	NAV	○	○	○	○	○	○	○	93%
IT system to support incidence resolution	○	●	○	○	○	○	○	○	○	75%
IT system to support distribution management	○	●	○	○	○	○	○	○	○	79%
IT system to support energy management	○	●	○	●	●	●	○	○	○	64%
Geographic Information System (GIS)	○	NAV	○	○	○	○	●	●	●	78%
KPIs are used to monitor quality of supply	○	NAV	○	○	○	○	NAV	○	○	100%
Advanced Metering Infrastructure (AMI)	●	NAV	●	●	○	○	○	○	○	52%
Accurate customer database	○	NAV	○	○	○	○	○	○	○	96%
Call center for dealing with customer complaints	○	NAV	○	○	○	○	○	○	○	96%
Website for submission of customer complaints	○	NAV	○	○	○	●	○	○	○	85%
Customer satisfaction regularly monitored	○	NAV	○	○	○	○	●	○	○	59%
Commercial management system (CMS)	●	NAV	○	○	○	●	●	●	●	41%
Resource Management System (RMS)	○	NAV	○	○	○	●	○	●	●	35%
KPIs are used to monitor commercial cycle	○	●	●	●	○	○	●	○	○	86%
KPIs are used to monitor corporate resource management	○	●	●	●	○	●	●	○	○	54%

Regulatory Governance

Accountability

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark	
Accountability	75%	85%	95%	69%	84%	83%	
Regulatory Oversight	67%	67%	100%	67%	67%	81%	
Regulator's objectives formally stated in	○	○	○	○	○	100%	
Regulator required to report on its	○	○	○	○	○	88%	
Independent third party evaluations of regulator have taken place	●	●	○	●	●	56%	
Legal Appeals	100%	100%	100%	100%	100%	100%	
Legally established process to challenge/appeal regulatory decisions	○	○	○	○	○	100%	
Transparency	57%	89%	85%	40%	85%	67%	
Publicly available annual reports	○	○	○	●	○	94%	
Recommendations are required to be made public	NAP	○	●	○	○	33%	
Government body receiving recommendations required to respond	NAP	●	●	●	○	33%	
Regulator is required to publish its decisions on-	End-user tariffs	○	○	○	○	○	100%
	Licensing generation or supply	NAP	NAP	○	NAP	○	100%
	Wholesale or PPA prices and contract terms	○	○	○	NAP	○	100%
	Market design	○	NAP	○	NAP	○	100%
	Oversight of regulated utilities	NAP	○	○	NAP	○	85%
Regulatory decision-making process legally requires the participation of non-government stakeholders in case of-	End-user tariffs	●	○	○	●	●	69%
	Licensing generation or supply	NAP	NAP	○	NAP	○	69%
	Wholesale or PPA prices and contract terms	●	○	○	NAP	○	38%
	Market design	●	NAP	○	NAP	●	30%
	Oversight of regulated utilities	NAP	○	○	NAP	○	38%

Autonomy

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Autonomy	60%	98%	51%	35%	68%	71%
Decision-Making Autonomy	64%	92%	79%	60%	86%	79%
Areas where entity has a mandate to regulate-	End-user tariffs	○	○	○	○	100%
	Quality of supply and service	○	○	○	NAP	100%
	Electrification or increased access to energy	●	○	●	NAP	53%
Decision of the regulatory entity are legally binding in the area of-	End-user tariffs	○	○	○	●	88%
	Grid access charges	○	○	○	NAP	87%
	PPA/wholesale prices	○	○	○	NAP	92%
	Quality of supply/service	○	○	○	NAP	87%
	Market design	○	NAP	○	NAP	50%
	Licensing	NAP	NAP	○	NAP	85%
	Utility oversight	NAP	○	●	NAP	71%
Government body rejecting or modifying regulatory decisions needs to make its reasons public	NAP	●	●	●	○	17%
Law precribes decision making process for-	End-user tariffs	●	○	○	○	94%
	Grid access charges	●	○	○	○	81%
	Quality of supply/service	●	○	○	NAP	87%
Budgetary Autonomy	88%	100%	50%	50%	100%	80%
Funding for regulator established by law	○	○	○	○	○	100%
Percentage of regulator's budget that comes from levies or taxes	0.752	1	0	0	1	59%
Leadership Autonomy	88%	100%	75%	29%	88%	66%
Legal basis for existence is primary legislation	○	○	○	○	○	100%
Power to determine own organizational structure and rules	○	○	●	●	○	50%
Power to determine the allocation and use of budget	○	○	○	●	●	44%
Legal requirements or restrictions regarding professional profile leadership	○	○	○	○	○	94%
There is a fixed term for the leadership of the regulatory entity	○	○	○	●	○	88%
Legal provisions under which leadership an be removed from office	○	○	○	●	○	75%
Current leadership of entity connected to government or utilities	●	○	●	●	○	25%
Over 60% of employees are in technical positions	○	○	○	NAV	○	57%
Managerial Autonomy	0%	100%	0%	0%	0%	59%
Pay scale not linked to govt pay scale or is 90% of utility pay scale	●	○	●	●	●	53%
Not required to follow govt employment regulations	●	○	●	●	●	63%

Regulatory Substance

Tariff Setting

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Tariff Regulation	92%	100%	93%	29%	83%	77%
Regulatory Framework for Tariffs	100%	100%	86%	33%	100%	90%
Objectives in determining tariffs mentioned explicitly in policy or legal mandate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	100%
Principles of tariff-setting clearly articulated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	88%
Authority over the tariff level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	94%
Clear definition of "cost recovery"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	88%
Legitimacy of costs is used as a basis for tariff calculations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	88%
Tariff-setting based on a clearly specified regulatory framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	88%
Frequency and schedule of revisions determined by law or regulation	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	NAP	NAP	75%
Determination of Tariffs	83%	100%	100%	25%	67%	64%
Publicly available written formula is to be used for tariff setting and utilities are legally required to adhere to it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	88%
Avoid passing-through inefficient costs to customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	76%
Requirement to submit financial information according to set standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	53%
Users bear the costs of incentive mechanisms for renewable energy generation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	75%
Regulatory mechanisms to compensate generators for the provision of firm capacity or ancillary services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	NAP	<input type="radio"/>	58%
Utilities are compensated for the costs of stranded assets	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	NAP	<input checked="" type="radio"/>	25%

Quality Regulation

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Quality Regulation	100%	100%	92%	43%	92%	75%
Quality of Service Standards	100%	100%	100%	36%	100%	82%
Requirement to meet quality of service standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	100%
Specific quality of service standards are formally written and publicly available for- quality of the product, quality of the	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	97%
Performance on quality of service standards is public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	71%
Fines for failing to meet quality of service standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	59%
Quality of Service Enforcement	100%	100%	83%	50%	83%	68%
Requirement to report technical data on a periodic basis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	100%
Regulator specifies how to collect technical performance data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	71%
Regulator reviews or validates technical performance data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	47%
Automated information management systems are required to measure the quality or reliability of the power supply	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	71%
Measurements of the quality or reliability of power supply are made public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	65%
Financial incentives to meet customer service standards or increase customer satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	53%

Market Entry

	Colombia	Peru	Philippines	Tajikistan	Ukraine	International Benchmark
Market Entry Regulation	50%	50%	100%	67%	50%	77%
Permitting New Entrants	50%	100%	100%	100%	100%	90%
Responsible for monitoring compliance with the terms of the license or permit	●	○	○	○	○	88%
Authority to impose penalties for violating license or permit terms	NAP	○	○	○	○	100%
Penalties are formally written and publicly available?	NAP	○	○	○	○	80%
Provisions to force companies to relinquish licenses or permits for violation	○	○	○	○	○	100%
PPA Approvals	50%	0%	100%	33%	0%	57%
Legally required to approve all power sales contracts either directly or indirectly	●	●	○	○	●	59%
Approve or refuse a proposed PPA in a legally specified period of time	NAP	NAP	○	●	NAP	60%
Authority over the process by which utilities can select or procure power from IPPs	○	●	○	●	●	50%

ANNEX B. TIMELINE OF COUNTRY / SECTOR REFORM

1991-1994

After the USSR breakup, post-socialist CEE countries separated their energy systems. Ministry of energy and electrification was founded.

1994

Creation of preconditions for replacement of administrative management to market system in the field of generation and supply of electricity, keeping Unified Energy System (UES) of Ukraine as a guarantor of reliable electricity supply for all regions of the country. These measures were introduced by the Decree of the President of Ukraine "On market transformation measures of the power sector of Ukraine" No 244, dd. 21.05.1994

The regulatory entity – the National Commission for State Energy Regulation (NERC) – was established in accordance with the Presidential Decree № 738/94 dated 08.12.1994.

1995

Implementation of power sector reforms started from execution of the Decree of the President of Ukraine dated April 4, 1995 No 282 "On Restructuring in Power Sector in Ukraine". Vertically integrated energy establishments were divided into separate companies of generation, transmission, distribution and supply of electricity. As a result, the basis for competition in generation and distribution was created with remaining of UES of Ukraine.

State joint-stock hydro energy generating companies "Dniprohydroenergo" and "Dnistrohydroenergo" were created by Ministry of energy and electrification.

State Committee for Energy Conservation were created by COM.

1996

In November the first 55 members of Wholesale electricity market (WEM) signed the Agreement between members of WEM of Ukraine.

1997

On 16 October the Law of Ukraine "On Electric Power Industry" No 575/97-BP was adopted. The Law provides for main definitions, outlines main objectives of state policy, establishes a framework for electricity market activity including the export of electricity and provides grounds for regulation in the electricity sector as well as envisages main rights and obligations of the players on electricity market.

Wholesale Electricity Market (WEM) is the core part of the electricity market in Ukraine and the only institutionally arranged electricity market in the country. In compliance with the Law of Ukraine "On Electric Power Industry", power plants are obliged to sell electricity produced exclusively to the WEM. The WEM is arranged based on a "single buyer" model.

NERC stated regulation of gas, oil and petroleum products markets in accordance with the Decree of the President of Ukraine No 853 dd. 19.08.1997.

1998

The Wholesale electricity market operator "Energorynok" was created as a separate department of NEC Ukrenergo in accordance with the decision of WEM Council.

The beginning of privatization for some regional electricity distribution and supply companies – "oblenergo".

2000

WEM operator was separated from NEC Ukrenergo and transformed into State Enterprise Energorynok in accordance with the Resolution of the Government of Ukraine No 755 dd. 05.05.2000.

In June and July amendments to the Law of Ukraine "On Electric Power Industry" were approved. The main condition of the Agreement between members of WEM were formalized in legislation along with the Rules of WEM. It became mandatory for all WEM participants to sign electricity purchase and sale contract with the wholesale supplier.

All Chernobyl nuclear power plant units were stopped. Generating power was compensated by 6-th power unit of Zaporizhia nuclear power plant (1000 MW) that started operation in 1996, and in subsequent years – similar units at Khmelnytsky (2005) and Rivne (2006) nuclear power plants.

A number of doubtful privatization cases for generation and distribution companies were created with the use of lawsuits. The "shadow" privatization was started.

2001

Renewal of parallel work between UES of Ukraine and UES of Russia.

2002

"Burshtyn Energy Island" started operation. The Island was synchronized and connected to the synchronous grid of Continental Europe via the power systems of Hungary and Slovakia and allowed Ukraine to export electricity.

All payments for electricity purchased from TPP Generation Companies are now conducted on the wholesale market in compliance with the Rules of WEM.

The Cabinet of Ministers adopted a Concept for the New Ukrainian Wholesale Electricity Market, but it could not be fully implemented.

2003

Dniprohydroenergo and Dnistrohhydroenergo were merged into State joint-stock company "Ukrhydroenergo".

Law of Ukraine "On Alternative Energy Sources" defines legal, economic, ecological and organizational principles of use of alternative energy sources

2004

The Cabinet of Ministers of Ukraine established NJSC "Energy Company of Ukraine" – the shareholder of 21 public joint stock companies that generate or supply electricity.

2005

According to the amendments to the Law of Ukraine "On Electric Power Industry", in every accounting period power generation companies (except wind power stations) and transmission and dispatching company should receive payments for supplied electricity in the equal percentage.

Settlement center was created inside SE Energorynok in order to solve problem of fuel-energy Sector companies' mutual debts, in accordance with the Law of Ukraine "On measures, to ensure stable operation of the fuel-energy sector companies".

2006

The Cabinet of Ministers of Ukraine approved the first Energy Strategy of Ukraine up to 2030. Provides government strategy for capacity expansion by nuclear and renewable energy technologies for electricity generation up until 2030

2007

The Cabinet of Ministers of Ukraine approved “Action Plan to implement the Concept of operation and development new WEM” and “Action Plan on reforming and developing the energy sector” (new bi-lateral contracts, day ahead and balancing market model)/

2008

The Law on Green Tariffs: “Amendments to the Law of Ukraine On Electrical Power Industry” Initial framework for Green Tariffs

2009

The amendments to the Law of Ukraine “On Electric Power Industry” regarding the development of renewable energy were approved. Revised framework for Green Tariffs Rate. SE “Energorynok” developed agreement for purchase of electricity generated from alternative energy sources.

The specifications of electricity export were defined by amendments to the Law of Ukraine “On Electric Power Industry”. Exported electricity should be purchased from WEM of Ukraine. Access to interstate lines should be granted on auction basis. Auctions for the period of less than 1 year should be conducted by NEC Ukrenergo.

2010

Ukraine joined the Energy Community. Continuation of privatization for the 2010 – 2012 period.

2011

Reorganization of NERC in accordance with the Decree of the President of Ukraine No 1059/2011 dd. 23.11.2011.

The regulatory entity National Commission for State Regulation of Public Utilities was established in accordance with the Decree of the President of Ukraine No 1073/2011 dd. 23.11.2011.

2013

The Law of Ukraine "On principles of functioning electricity market of Ukraine" was approved, but its implementation has not taken place. In 2016 passed a new first reading similar law that takes into account the requirements of the 3rd EU Energy Package.

2014

UES of Ukraine lost part of energy assets. In response to a worsening situation regarding electricity generation due to loading problems of certain coal fired power plants supplied with coal, the Government adopted a number of emergency measures for the electricity market as of August 2014. This emergency situation also contributed to the slowing down of the urgently needed reforms towards market liberalization.

The Cabinet of Ministers of Ukraine approved the resolution to terminate NJSC "Energy Company of Ukraine".

National Commission for State Regulation of Public Utilities and NERC were merged into the new National Commission for State Regulation of Energy and Public Utilities (NEURC) in accordance with the Decree of the President of Ukraine No 694/2014 dd. 27.08.2014.

2015

NEURC introduced incentivizing tariff for distribution companies, constructed on regulatory asset base (RAB).

NEURC approved the Resolution “On establishment of tariffs for electricity sold to the households” № 220 dd. 26.02.2015 with gradual tariff increase up to 2017. NEURC jointly with the Energy

Community Secretariat experts have developed the draft law of Ukraine "On the State Regulation in the Energy Sector". The draft law was approved at a meeting of the Cabinet of Ministers of Ukraine on 25 March 2015. It was finally passed by the Parliament on September 2015.