German Advisory Group

Institute for Economic Research and Policy Consulting

Policy Paper Series [PP/07/2009]

Exporting electricity to the EU – more than switching frequencies

Georg Zachmann, Dmytro Naumenko

Berlin/Kyiv, November 2009

About the Institute for Economic Research and Policy Consulting

Institute for Economic Research and Policy Consulting (IER) is the leading Ukrainian analytical think tank focusing on economic research and policy advice. The IER was founded in October 1999 by top-ranking Ukrainian politicians and the German Advisory Group on Economic Reforms.

The mission of IER is to present an alternative point of view on key problems of social and economic development of Ukraine. In frame of the mission IER aims at providing top quality expertise in the field of economy and economic policy-making; acting as real leader of public opinion through organisation of open public dialog; contributing to the development of economic and political sciences as well as promoting development of Ukrainian research community.

Institute for Economic Research and Policy Consulting
Reytarska 8/5-A,
01034 Kyiv, Ukraine
Tel: +38 044 / 278 63 42
Fax: +38 044 / 278 63 36
institute@ier.kiev.ua
http://www.ier.kiev.ua

About the German Advisory Group

The German Advisory Group on Economic Reforms, which is active in Ukraine since 1994, advises the Ukrainian Government and other state authorities such as the National Bank of Ukraine on a wide range of economic policy issues and on financial sector development. Our analytical work is presented and discussed during regular meetings with high-level decision makers. The group is financed by the German Federal Ministry of Economics and Technology under the TRANSFORM programme and its successor.

German Advisory Group
c/o Berlin Economics
Schillerstr. 59
D-10627 Berlin
Tel: +49 30 / 20 61 34 64 0
Fax: +49 30 / 20 61 34 64 9
info@beratergruppe-ukraine.de
www.beratergruppe-ukraine.de

© 2009 German Advisory Group

© 2009 Institute for Economic Research and Policy Consulting

All rights reserved.

Exporting electricity to the EU – more than switching frequencies

Executive Summary

The Ukrainian electricity sector features remarkably high nominal reserve margins. Its electricity generation capacities exceed the peak load by more than 40%. The crisis driven dip in electricity demand is further deteriorating the load factors of the Ukrainian power plant fleet. While increasing exports to Eastern neighbours is not economic at prices of about 40 USD/MWh, expanding the sales to EU countries that pay about 60 USD/MWh is technically limited. But, currently different options to alleviate these bottlenecks are discussed. In addition to technical issues also legal barriers to increase Ukraine's electricity exports might exist. Especially a requirement to comply with European electricity sector standards might discourage exports. In this paper we therefore analyse how the implementation of the EU emission trading scheme influences the profitability Ukrainian electricity exports.

Evaluating the Ukrainian power plant fleet we find that a large fraction of Ukraine's thermal power plant capacities are not actually available. Based on an estimation of the marginal cost curve of the Ukrainian electricity generation sector we conclude that the profitability of Ukrainian electricity exports depends on their treatment under the EU emission trading scheme (EU ETS). If Ukraine remains exempt from the EU ETS and under the assumption of moderate fuel prices, annual profits of USD 416 m could be generated by exporting a 2,500 MW baseload band (i.e., 22 TWh) to the EU. If, however, the EU does not accept an increase of imports from Ukraine unless this country introduces a moderate 20 USD/t carbon tax, exporting Ukrainian electricity to the EU will be loss making. Consequently, the profitability of Ukrainian electricity in Western Europe depends on the requirements imposed for compliance with Western standards. We believe that the European electricity industry and politics would veto massive imports of electricity not generated under the costly European regime. Thus, a long-term electricity export strategy should be developed, that not only takes the necessary investment in network extensions into account but also considers reductions in greenhouse-gas emission and compliance with EU pollution standards.

Authors

Georg Zachmann	zachmann@berlin-economics.com	+49 30 / 20 61 34 64 3
Dmytro Naumenko	naumenko@ier.kiev.ua	+380 44 / 235 63 42

Acknowledgements

The authors would like to express their gratitude to Ferdinand Pavel, Sergei Gorbachev and Dennis Sakva for helpful discussions, data and suggestions. The usual disclaimer applies.

Contents

1. Introduction ……1
2. Surplus generation in Ukraine ……1
3. Economic Export Potential ……6
4. Conclusion ……10
5. References ……11

1. Introduction

Ukraine's electricity sector is enduring a period of considerable stress. The economic crisis caused internal consumption and external demand to fall, leading to deteriorating capacity utilization at Ukraine's power plants and decreasing generation companies' margins. Political support for Ukraine's coal mining industry is partly channelled through the pockets of the coal-burning power producers. Privatization is not taking-off and legal fights over company control create uncertainty and deteriorate the investment climate. Finally, prices for final consumer are still far from covering cost or even stimulating investments. Due to this challenging political/economic environment the envisaged fundamental market reform is struggling and will (at best) be postponed for a couple of years.

One solution that is discussed is an increased West integration of Ukraine's electricity system. While currently only Burshtyn Island with its rather moderate generation capacity is connected to the Central and West European electricity system (UCTE), there is discussion about increasing the export potential of Ukraine. This, the argument goes, would help the Ukraine to better use its underused power plants and allow to generate the funds needed for the future investment needs. However, it has often been overseen, that significantly increasing exports to the EU will stipulate opposition from European generators that will feat to loose market shares. Thus, it is highly likely that those companies will ask their national governments and the EU to allow imports only from states that meet the European standards. Apart from the quite substantial one-time investments to comply with non-greenhouse gas pollution standards set in the "Large Combustion Plant" Directive and the "Integrated Pollution Prevention & Control" Directive, especially the participation in the European carbon reduction mechanism will affect the competitiveness of Ukrainian generators. This is due to the functioning of the EU emission trading scheme that requires polluters to hold costly emission rights and thus constitutes a variable cost. In this article we will analyse how a potential requirement to get involved in the EU ETS will affect the profitability of Ukraine's electricity exports. Therefore in the next section we will explain the key issues (high nominal excess capacities, falling demand, and discussion on West-integration). In the third section the real excess capacity as well as the fair price for Ukraine's electricity exports are studied. Based on this analysis we conclude on how the treatment of emissions will affect the profitability of exports and provide policy recommendations.

2. Surplus generation in Ukraine

Excess Capacities

In 2008 installed electricity generation capacity was about 53 GW, while the load maximum within the recent years has not exceeded 31 GW.[1] Consequently the nominal reserve margin was 41%. This is a huge amount compared to other countries (Belarus 2005: 20%, Russia 2005: 31%). Since then, nominal installed electricity generation capacity did not change dramatically[2] while strongly demand decreased strongly in 2008 (see below) the nominal reserve margin is presumed to have grown further.

Falling electricity demand

Following the decline in industrial production since the third quarter of 2008, electricity consumption decreased sharply. Electricity demand fell by 13% in the first three quarters

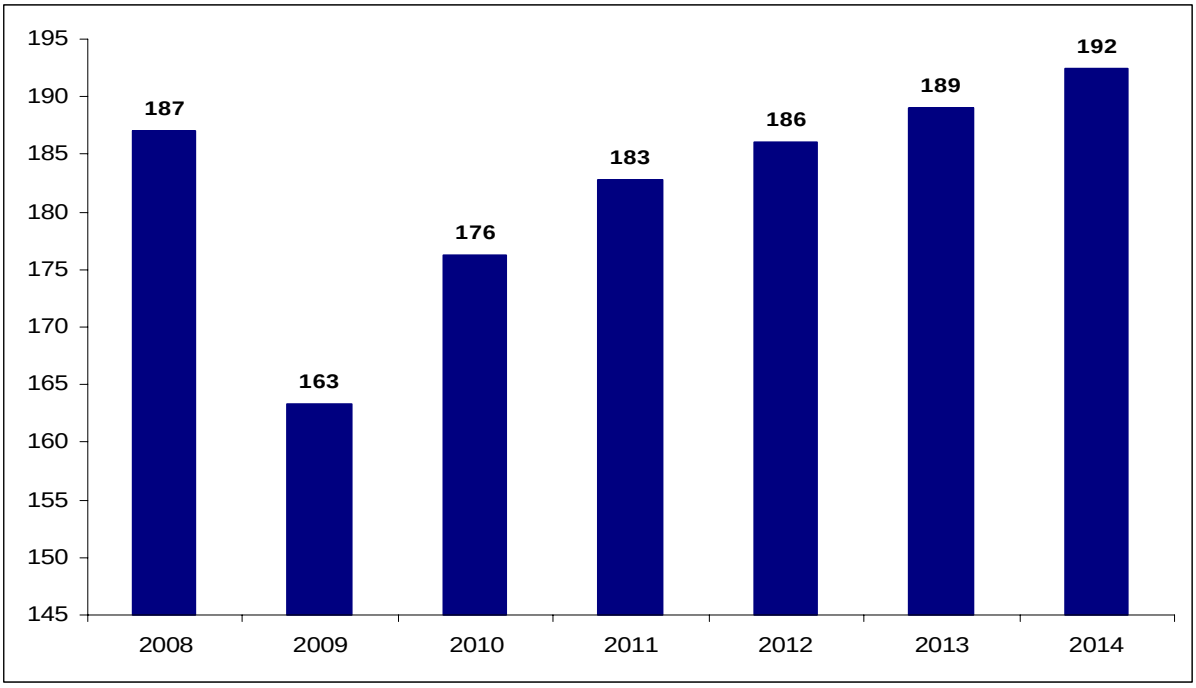
[1] According to the Ministry of Fuel and Energy

[2] According to the Ministry of Fuel and Energy at the end of 2008, the installed capacity of power grid system of Ukraine is 52,590.78 MW.

of 2009 compared to the first three quarters of 2008 (see Figure 1).[3] This decline is solely due to decreasing electricity consumption from industrial producers, as households increased their electricity consumption in this period. Based on assuming an average 5% annual growth rate in 2010-2016 in Ukraine's industrial output, Troika (2009) estimates that the level of electricity consumption in 2008 will only be reached by 2013.

Figure 1:

Gross electricity demand forecast in TWh



Source: DTEK 2009

Low load factors

Due to the global economic crisis also the electricity demand in all countries that import electricity from Ukraine significantly dropped. Due to this decline in internal and external demand, the utilization of the power plant park further deteriorated.

Table 1:

Capacity utilization of the biggest thermal power plants by company

Electricity generator (power station)	Load factor (2008)	Load factor (1H 2009)	Load factor (9M 2009)
Dniproenergo	22.3	16.1	17.1
Donbasenergo	30.9	29.1	29.7
Zahidenergo	38.6	32.6	32.3
Centrenergo	23.6	17.2	18.9
Vostokenergo	53.2	40.8	43.1

Source: Derzhkomstat, Energobusiness magazine

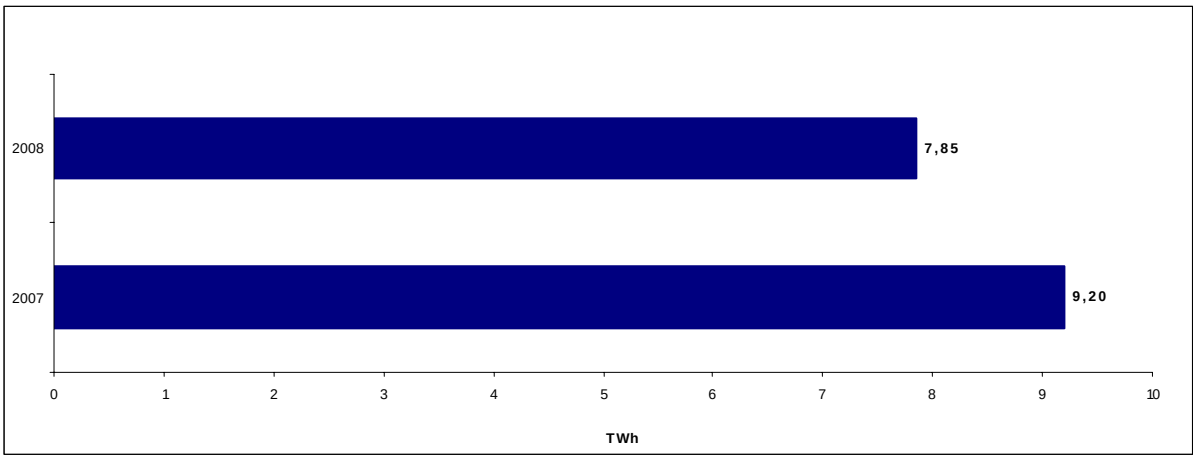
[3] According to the Ministry of Fuel and Energy statistical report for 9M 2009 as on 19 October 2009.

Limited Export Potential

The high excess capacities make exporting electricity a straightforward option for Ukraine's electricity generation companies. Consequently, electricity exports in 2008 were 7,852,804 MWh.

Figure 2:

Electricity exports in 2007 and 2008

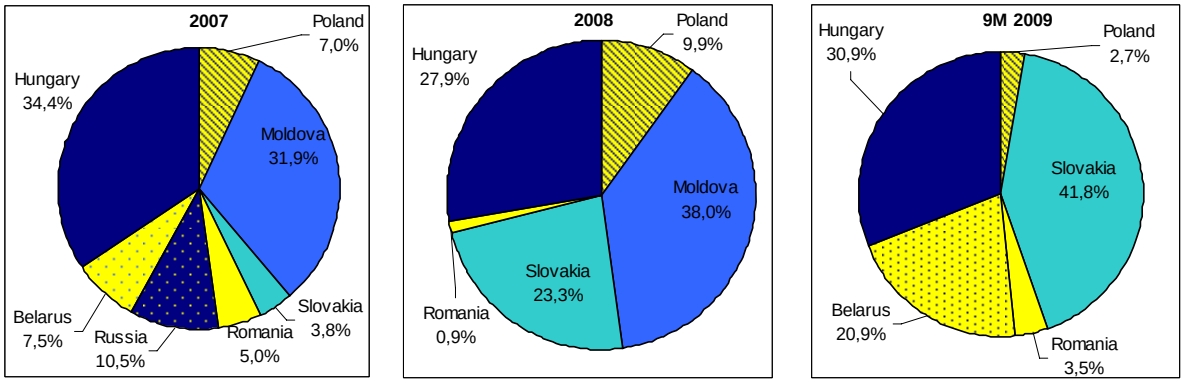


Source: The Ministry of Fuel and Energy

While in 2007, exports to other CIS countries made up almost half of the exports, electricity sales to Russia and Belarus were stopped in 2008 and Moldova was the only country in the Integrated Power System (see box below) that received significant amounts of electricity from Ukraine. After exports to Moldova were stopped and electricity exports to Belarus were only temporarily resumed electricity exports fell by 54% yoy (comparing the first nine month of 2009 and 2008). While the still higher prices in the West suggest further increasing the share of exports to UCTE zone (see box below), there are technical limitations that need to be considered.

Figure 3:

Electricity exports in 2007, 2008 and 2009 by country



Source: The Ministry of Fuel and Energy

Historically, Ukraine was well connected to its Western neighbours Poland, Slovakia, Hungary, Romania. With the end of the old Interconnected Power System in the late 1990s Ukraine was desynchronized from its Western neighbours. Due to the differing frequencies, Alternating Current (AC) exports to the aforementioned countries were no more technically feasible. With the synchronization of Bushtyn Island to the UCTE zone

Ukraine could since 2003 export 500 MW in winter and 550 MW in summer. This implies maximal annual exports of roughly 4.6 TWh.

Box:

International transmission systems

The **Integrated Power System (IPS)**[4] is the synchronous transmission system of the CIS (excluding Armenia and Turkmenistan), Georgia, Ukraine and the Baltic states. It is the most geographically extended power system in the world spanning 8 time zones and has a total installed generating capacity of 335 GW and an annual generation of 1200 TWh. Until the 1990s the entire European COMECON area was part of the IPS. In various steps, Eastern Germany, Poland, Czech Republic, Hungary, Slovakia, Romania and Bulgaria left the IPS to join the UCTE. The IPS was separated in 1998-1999. From 2000 on it was successively restored. In August 2001 the Ukrainian and Moldavian power systems re-joined the IPS.[5]

The **Union for the Coordination of Transmission of Electricity (UCTE)** operates the continental European synchronous grid (i.e., excluding the islands and the Nordic countries). Starting as a purely West European synchronous zone it has been significantly expanded over the last 15 years by integrating power systems of Eastern European countries. Since 2003, the Western part of the Ukrainian power system, the so called "Burshtyn TPP Island," operates synchronously with UCTE.

From 01 July 2009 on the **European Network of Transmission System Operators for Electricity (ENTSO-E)** took over all operational tasks of the 6 existing TSO associations in Europe, including UCTE.

Table 2:

Export Power Interconnectors and Export Capabilities of Ukraine

Name of neighbouring country	Number of OHTLs by voltage type					Maximum available transmission capacity of the line, bn kWh per year	Electricity export in 2005 bn kWh
	750 kV	400-500 kV	220-330 kV	110-0.4 kV	Total		
Russian Federation	1	3*	10	18	**32**	26.3	2.0
Moldova			7	18	**25**	1.5	1.6
Belarus			2	6	**8**	6.1	-
Poland	1		1		**2**		
Slovakia		1		1	**2**	UCTE	
Hungary	1	1	2		**4**	5.0**	4.8
Romania	1	1			**2**	49.0***	

* - one 400 kV DC HVTL;

** - under the condition of operation of Burshtyn Power Island;

*** - under the condition of parallel synchronised operation.

Source: Energy Strategy of Ukraine for the period of up to 2030

[4] Also known as "Interconnected Power Systems/Unified Powers Systems" (IPS/UPS) whereby the UPS refers to the Russian part of the international system.

[5] Source: Djangirov and Barinov (2002).

Interim conclusion

Ukraine has physical electricity generation capacities that exceed its peak demand by more than 40%. In the past, a part of this overcapacity was used to export electricity to both Eastern and the Western neighbours. Falling internal demand caused Ukraine's power plants load factors to further deteriorate. The significantly stronger decrease in electricity demand in Russia than in Hungary or Poland as well as the higher electricity prices in the West made Ukrainian generation companies interested in increasing exports to the West. Currently, this wish is constraint by technical limitations.

Discussion on West-integration

For various political and economic reasons but in particular to increase Ukraine's electricity exports to the West a stronger integration of Ukraine into UCTE has been discussed for years. Thereby, the substantial export potentials is a key argument. Based on the described comfortable reserve margins, the low baseload generation cost (nuclear and hydro) and the finding that electricity prices in the West are significantly higher than in the East (see ***Table 3***) analysts make the point that Ukraine could sell cheap domestic electricity with a nice profit on the Western market.

Table 3:

Average electricity export price by country in 1H 2009

	Average price (USD/MWh)
Belarus (IPS)	44.24
Moldova (IPS)	48.49
Russia (IPS)	48.60
Romania (UCTE)	59.36
Slovakia (UCTE)	62.26
Hungary (UCTE)	63.01

Source: Derzhkonstat, own calculations

These exports could be made possible either through a full integration of Ukraine's electricity system into UCTE[6] or a partial inclusion of additional generation capacities via discrete technical solutions (e.g., installing up to three Back-to-back Stations 600 MW each to reuse the existing 750 kV lines between Ukraine and its western neighbours, namely Zakhidnoukrainska – Albertirsa (Hungary), Khmelnitska NPP – Rzeszow (Poland) and Pivdennoukrainska NPP – Isakca (Romania)[7].

Cost of West Integration for the Electricity Sector

Currently the UCTE only has members that are either part of the Energy Community, the EU or the EFTA. The Energy Community treaty ensures that signatory states (mainly in South-Eastern Europe) will adopt EU single market regulations regarding energy within a given timeframe (the EU acquis communautaire in the relevant fields of Energy, Environment, Competition and others). So far, Ukraine only has an observer status with the Energy Community but is about to negotiate its full accession. From the experiences of the Central and East European countries that joined both the EU and the UCTE on can extrapolate that fulfilling the requirements of the acquis communautaire could be quite

[6] "On 22 April 2008 ministerial negotiations between Moldova and Ukraine included discussions on joining UCTE. In September 2008 State enterprise "National power company Ukrenergo" announced tender on technical solutions to account for the exchange of power between Ukraine's power supply system and UCTE. Still the Ministry of Fuel and Energy does not expect Ukraine to join UCTE earlier than 2012."

[7] Energy Strategy of Ukraine for the period of up to 2030.

costly. Especially compliance with the "Large Combustion Plant" Directive and the "Integrated Pollution Prevention & Control" Directive was a substantial challenge for thermally dominated generation systems such as the Polish.

Another cost factor that is largely overlooked is the treatment of emission reduction legislation. While the EFTA countries Norway and Lichtenstein are in the EU emission trading scheme (EU ETS) Switzerland has its own ETS that is, however, linked to the EU ETS. Other countries linked to the EU electricity grids[8] are so far exempt from obligations under the EU ETS. This has so far been no big issue, as net exports of most countries (apart of Russia's exports to the Baltic countries and Finland) are insignificant. This, will change with a stronger integration of Ukraine into the UCTE. Thus, there are reasons to believe, that the EU and in particular the European electricity generators will not accept a massive extension "dirty" imports. Therefore, we consider it likely that the cost for carbon applicable in the EU will be also burdened on Ukrainian exports. This could be achieved either via an explicit border tax (equivalent to the emission allowance spot price) or an inclusion in the EU ETS. In the following we will discuss, how such a climate mark-up will feed into the electricity export potential of Ukraine.

3. Economic Export Potential

To calculate the economic export potential we proceed in four steps. First we calculate for each production volume the marginal cost of electricity generation in the Ukraine power plant park (so-called "merit-order"). Then, we approximate a stylized curve of the hourly electricity demand for one year (so-called "load curve"). Third, we calculate the average marginal cost for producing more electricity than domestically needed. And finally we compare this cost to the electricity prices in target markets.

Calculate the marginal cost curve

Physical capacities: A World Bank 2007 study finds that out of the 27,150 MW installed capacity in *thermal power plants* only 19,848 MW were available. The rest was categorized as "dead storage", "reserve" or under rehabilitation. In addition, 13,168 MW were installed at *nuclear power plants* and 4,600 MW at *hydro power plants*. Due to technical reasons, available power plants have to be taken from the grid from time to time, e.g., for maintenance. Thus, we adjust the capacity of each power plant by an availability factor deduced from Weigt et al. (2007). Correspondingly, only 83% of the thermal, 80% of the nuclear and 62% of the hydro power plant capacity of each block are assumed available.[9] The capacities installed in *combined heat and power plants* (6357.3 MW in 2009 according to the Ministry of Fuel and Energy) are considered separately for summer and winter. Based on the very low annualized load factor of about 10% we assume that only 3000 MW are available at any point in time.

Variable cost: Of the installed electricity generation capacity, certain cheap baseload plants are never price setting. Consequently, assuming zero variable cost for all nuclear and hydro plants is a simplifying assumption that does not affect our marginal cost analysis.[10] The combined heat and power plants are assumed to be baseload producer in winter as they would run mainly for heating purposes in this season. In summer, when they run in condensing mode they feature uncompetitive high cost as most of them are natural gas fired and feature lower efficiencies than pure condensing natural gas fired power plants. For thermal power plants (i.e., coal and natural gas burning units) the

[8] Marocco, Russia, Ukraine and the non-EU Balkan countries.

[9] This is a rough assumption as newer units will need less maintenance, maintenance periods are not random but could be partly scheduled by the owner and especially for hydro and nuclear power plants availability depends on the weather conditions.

[10] The availability adjusted capacity of hydro and nuclear power plants is 13,400 MW while the lowest load is 15,000 MW.

variable cost could be approximated based on their fuel efficiency. The efficiency of Ukrainian thermal power plant blocks is given in gram of standard fuel per kWh. Based on the calorific value of 8141 kWh per tonne of coal equivalent the corresponding efficiency level could be calculated. For example, 400 g/kWh correspond to an efficiency level of 31%. Assuming that fuel and emission cost are the main driver of the variable cost, the cost for each block could be calculated given the price of the corresponding fuel, the price of emission allowances and the efficiency of this unit. For calculating the emission cost we assume that each calorific kWh of input coal leads to 400 grams of CO2 emissions while the corresponding factor for natural gas is 200 g/kWh of natural gas input.[11] Due to the high uncertainty corresponding to future (and even current) cost of fuels and emissions we propose six scenarios described in ***Table 4***.

As coal is the main fuel for Ukraine's thermal power plants the main assumption for calculating electricity generation cost in this country is the coal price. Taking into account, that Ukraine's coal industry does not have a significant competitive advantage over other coal producers the world market price could be a good indicator for the true coal cost in Ukraine. Consequently, the coal import price for Germany in 2Q09 of 76.35 EUR/tonne of coal equivalent or 115 USD/tce is a reasonable benchmark.

In the low price scenario, prices in Ukraine are 40% below this benchmark (70 USD/tce), in the medium scenario 10% below this benchmark (100 USD/tce) and in the high scenario 25% above this benchmark (150 USD/tce). For the natural gas price we assume 230 USD/tcm, 350 USD/tcm and 450 USD/tcm to cover the spectrum of possible future developments.

For the carbon cost we have two scenarios. In the no carbon scenario Ukraine will continue to be exempt from the EU emission trading scheme (EU ETS) even if exporting electricity to its Western neighbours. This could be based on the political/legal (though not economically viable) argumentation that only electricity from the carbon-free power plants is exported. The more likely scenario is that the EU will via a border tax, an inclusion of Ukraine's power plants into the EU ETS or another mechanism enforce a price for carbon on Ukraine's electricity generators. This is rational from a climate economic point of view, as the production in thermal plants must be increased to accommodate the export demand. In this scenario we assume a rather moderate tax/cost for emission allowances of about 20 USD/t.

Table 4:

Scenarios

	Natural gas price (USD/tcm)	Coal price (USD/ tce[12])	Emission allowance Price (USD/t)
Scenario 1: low no carbon	230	70	0
Scenario 2: medium no carbon	350	100	0
Scenario 3: high no carbon	450	150	0
Scenario 4: low carbon	230	70	20
Scenario 5: medium carbon	350	100	20
Scenario 6: high carbon	450	150	20

Source: own assumptions

Based on the presented assumptions and methodology we calculate the marginal cost curve for Ukraine's electricity generators. As **Figure 4** indicates, the cost spread for coal

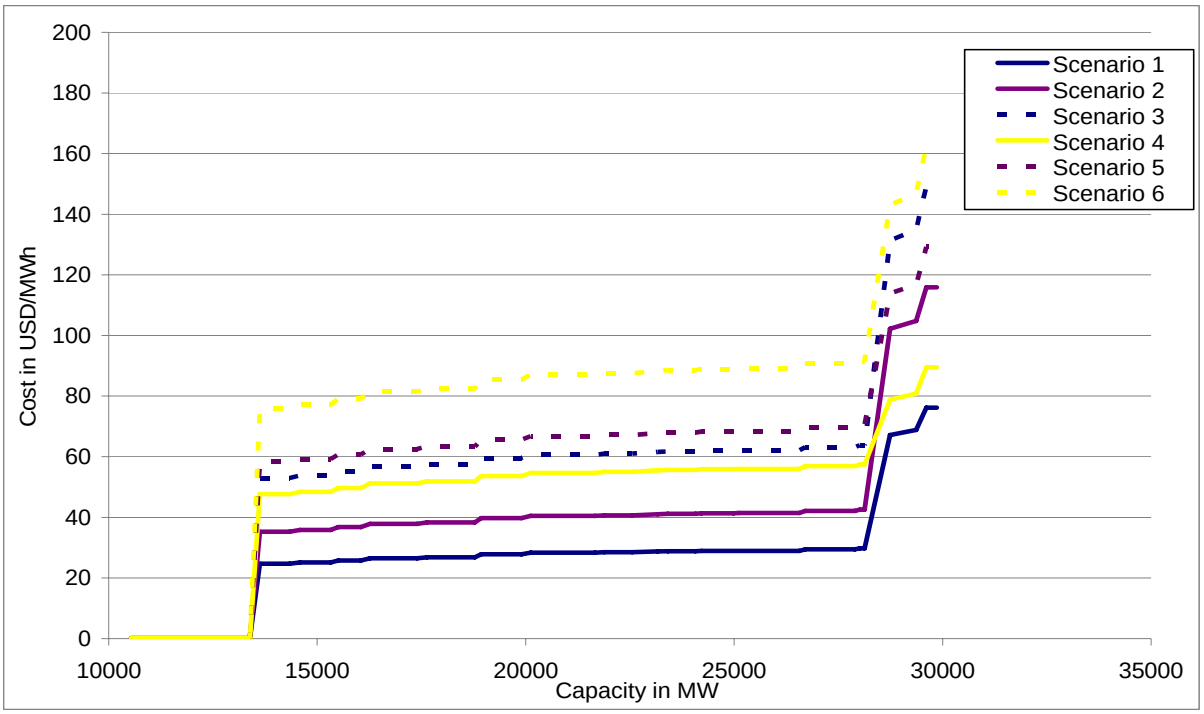
[11] The input approach is chosen, as thus inefficient power plants produce more emissions per electricity produced than efficient power plants.

[12] tce - tonnes of coal equivalent.

fired power plants is rather modest. This is due to the comparable efficiency of the corresponding units (350-425 g/kWh or 29% - 35%). Due to these low efficiencies even a moderate carbon price leads to a significant increase in electricity prices of around 25 USD/MWh (compare Scenario 2 and Scenario 5).

Figure 4:

Merit Order



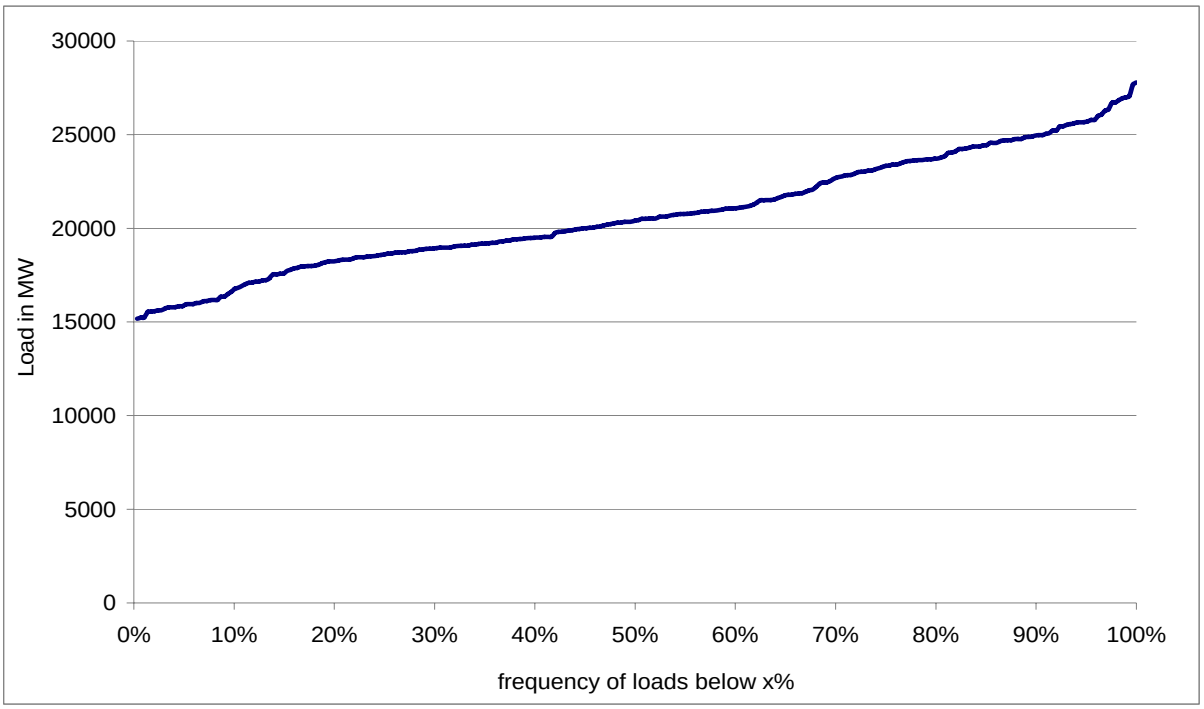
Source: own calculations

Calculate an annual load curve

Ukraine could only export electricity that is not consumed domestically. Based on monthly load data and the hourly data of the peak load day in 2005 we calculate a load curve. Thereby, 2005 was chosen as the total load of 177 TWh was close to the value expected for 2010. The minimum hourly load of 15,200 MW the median hourly load of 20,400 MW and the maximal hourly load of 27,800 MW provide a slightly skewed but not very sharp load profile (peak is less than 36% above the median, Germany 38%, Belarus >50%). This is a good premise for exporting baseload electricity bands.

Figure 5:

Load curve based on data for 2005



Source: own calculations, http://energo-cis.org

Calculate the average marginal cost

Given the load curve and the merit order it is now possible to calculate at which cost Ukraine could sell electricity to its neighbours. Therefore, we calculate for different export volumes the marginal cost for each hour. Then we average the cost over all hours of the year to obtain the average marginal cost for this export volume. For example we want to export a baseload band of 1,000 MW. In the minimum load hour the load is 15,200 MW. Adding the exports gives 16,200 MW. For producing 16,200 MWh the marginal cost under Scenario 5 are 60.74 USD/MWh. In the maximum load hour 27,800 + 1,000 MWh need to be produced. At this load one already need to switch on the gas-fired power stations bringing the marginal cost to 113.86 USD/MWh. Averaging the marginal cost for all 8760 hours of the year gives an average marginal cost of 65 USD/MWh for exporting a 1000 MW band in scenario 5.[13]

[13] Note, that if exports on an hourly basis are possible, the export potential might be higher as if only comparing average export price with average marginal cost, as in this case Ukraine has the option to sell electricity based on hourly differentials in domestic cost and foreign prices. The difference will, however, not be dramatic, as the hourly load curves / price curves feature a comparable profile.

Table 5:

Annual average marginal cost in USD/MWh

	0 MW	500 MW	1000 MW	1500 MW	2000 MW	2500 MW
Scenario 1	26	27	27	28	28	29
Scenario 2	37	38	39	40	41	41
Scenario 3	56	57	59	60	61	61
Scenario 4	50	51	53	54	54	54
Scenario 5	**62**	**63**	**65**	**66**	**66**	**67**
Scenario 6	80	82	84	86	87	87

Source: own calculations

Compare the average marginal cost to the prices and calculate the profits

The average price for electricity exports in 1H 2009 to UCTE neighbours of around 60 USD/MWh (see ***Table 3***) indicates that exporting a 1000 MW baseload band to the EU is only profitable under Scenarios 1, 2 and 4. Thereby, substantial margins (Scenario 1: 33 USD/MWh and Scenario 2: 22 USD/MWh) are to be obtained. Taking into account network losses and other cost, exports do not break even once moderate carbon pricing is considered (Scenario 4-6). Consequently, Ukrainian exports are only competitive when Ukraine is able to avoid being included in the EU ETS even though it competes with EU power companies that have to hold costly allowances for their greenhouse gas emissions.

4. Conclusion

In the paper we estimate based on publicly available data the marginal cost curve (merit order) of the Ukrainian power plant fleet. Based on assessing the physically available power plants we find that the physical electricity export potential of Ukraine is more limited than could be concluded from the comfortable reserve margin. Furthermore, the cost structure of the normally marginal costs (i.e., price setting) of thermal power plants strongly depends on the coal and carbon price. In the scenario we consider most likely, a carbon price of 20 USD/t and a coal price of 100 USD/tce lead to average marginal electricity generation cost of 62 USD/MWh. Increasing exports would cause these cost to rise further as more expensive power plants would need to be switched on to satisfy demand. As export prices in early 2009 were about 60 USD/MWh increasing exports would not be profitable for the Ukrainian power sector. Consequently, Ukraine's electricity sector is currently only competitive in the European market if it is exempt from European rules.

To overcome this dilemma we suggest four major steps:

1. Agree a clear transition agreement with the EU on when and how which of the relevant Directives will be implemented to create regulatory certainty for investments. In this respect an accession of the Energy Community, as is currently discussed, would be very helpful.
2. Develop together with the EU counterparties a fair long-term approach to treat carbon emissions related to electricity exports.
3. Increase the export potentials by reducing domestic demand. This includes cost-based prices for all domestic and industrial customers and electricity efficiency measures in the state sector.

4. Improve the competitiveness of the Ukrainian electricity sector by letting markets decide on the scheduling of power plants, the economic viability of coal mines and the profitability of power plants. This includes the envisaged reform of the wholesale electricity market (WEM) that is currently in serious threat of being significantly delayed. Furthermore, determined steps to privatise generation companies are essential to stimulate investments.

5. References

BRAAC (2009): Policy recommendations on economic and institutional reforms. The Blue Ribbon Analytical and Advisory Centre Kyiv, April 2009.

Djangirov, V.A., Barinov, V.A. (2002): "Forming electricity markets in the commonwealth of independent states and its impact upon power system development". CIGRE 2002, session proceedings.

DTEK (2009). "Power sector: strategic priorities", presentation by Vitaly G. Butenko (Chief Strategy Officer) on March 2009 in London, UK.

The Ministry of Fuel and Energy (2009). "Privatization of the Ukrainian Thermal Power Generation Companies". Presentation by the Ministry of Fuel and Energy in May 2009.

UKRENERGO (2006). Ukrainian Transmission System Operator – National Power Company "UKRENERGO". Black Sea Energy Conference 3-5 April 2006, Bucharest, Romania.

Weigt, H., von Hirschhausen, C., Zachmann, G. (2007). "Preisbildung und Marktmacht auf den Elektrizitätsmärkten in Deutschland". EE2 Electricity Markets Working Papers WP-EM-15.

World Bank (2007). "Rehabilitation of Thermal Power Plants in Ukraine: Assessment of Needs, Costs and Benefits."

List of recent Policy Papers

- Current issues of monetary policy in Ukraine by Ricardo Giucci, Robert Kirchner, Vitaliy Kravchuk, Policy Paper 06, November 2009
- Administrative measures to support the hryvnia: An appropriate instrument of exchange rate policy?, by Ricardo Giucci, Robert Kirchner, Vitaliy Kravchuk, Policy Paper 05, October 2009
- The gas challenge. On securing natural gas transits and stabilising the domestic market in Ukraine, by Ferdinand Pavel and Dmytro Naumenko Policy Paper 04, July 2009
- Only the fast privatization of Ukrtelecom will secure the further development of the telecommunication sector in Ukraine, by Lars Handrich, Policy Paper 03, July 2009
- How to develop a public debt market for retail investors?, by Ricardo Giucci, Robert Kirchner and Cyrus de la Rubia, Policy Paper 02, July 2009
- The Role of Trade Policy in Reducing Ukraine's Current Account Deficit - Lessons from Abroad, by Christian Helmers, Veronika Movchan, Ricardo Giucci and Kateryna Kutsenko Policy Paper 01, March 2009
- Assessing the impact of the protracted economic slowdown on the pension insurance in Ukraine: Hope for the best, but prepare fort he worst! by Lars Handrich, Oleksandra Betliy, Policy Paper 10, December 2008
- Developing the market for foreign exchange derivates in Ukraine: Sequencing the reform steps, by Robert Kirchner, Ricardo Giucci , Alla Kobylyanska, Policy Paper 09, December 2008
- Deposit Insurance in Ukraine: Time for Reform?, by Ricardo Giucci, Robert Kirchner, Policy Paper 08, November 2008
- Principles and methods of targeted social assistance: Policy recommendations for Ukraine, by Lars Handrich and Oleksandra Betliy, Policy Paper 07, October 2008.
- How to deal with 'European gas prices' in Ukraine?, by Ferdinand Pavel and Inna Yuzefovych, Policy Paper 06, October 2008.
- Inflation in Ukraine: Results and Policy Implications of an Empirical Study, by Robert Kirchner, Enzo Weber and Ricardo Giucci, Policy Paper 05, October 2008.
- The Housing Construction Sector in Ukraine: Reasons for the Current Recession and Policy Implications, by Ricardo Giucci, Robert Kirchner and Roman Voznyak, Policy Paper 04, October 2008.
- The Policy Interaction between the Government and the National Bank of Ukraine: Assessment of the Current Framework and Policy Recommendations, by Robert Kirchner, Ricardo Giucci and Vitaliy Kravchuk, Policy Paper 03, August 2008.
- Inflation Expectations: Importance and Measurement, by Robert Kirchner, Ricardo Giucci, Yaroslava Suchok, Oksana Kuziakiv and Veronika Movchan, Policy Paper 02, June 2008.

All papers can be downloaded free of charge under http://www.ier.kiev.ua/English/papers/papers_eng.phtml. For more information on subscription to our regular email-distribution, please contact Ms Alina Dolya by email: dolya@ier.kiev.ua.