Electricity Reform in Romania

by

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Abstract: Romania is a net exporter of electricity to the SE Europe region. Its performance of this role will increase in importance with a) the completion of another nuclear generator and b) improvement in capacity for international transmission. Romania has committed itself to an electricity restructuring plan that includes vertical separation, but plans remain uncertain regarding the horizontal restructuring of generation. Among the more important issues yet to be decided are a) how hydro capacity will be allocated – it has more than ¼ of capacity and enjoys low costs – and b) how many thermal generation enterprises will be created, and with what assets. With more than ½ of the thermal capacity accounted for by CHP plants and with a winter demand peak for the foreseeable future, there is a real danger of inflexibility and a lack of competitiveness in a liberalised wholesale electricity market.

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1. Background

Romania is well along in the process of restructuring its electricity industry in compliance with European Union directives (Binig, *et al*., 2000; Oprescu, *et al*., 2002). Over the 1998–2000 period the vertically integrated, state owned monopoly was divided into five separate state owned enterprises: one each for nuclear generation (Nuclearelectrica), hydro generation (Hidroelectrica), thermal generation (Termoelectrica), transmission (Transelectrica), and distribution (Electrica). Since then the distribution function has been further divided into eight regional companies, with four of these privatised to foreign buyers (Electrica Oltenia to CEZ, Electrica Moldova to E.ON, and Electrica Muntenia Sud, Electrica Banat and Electrica Dobrogea to Enel).[1] Termoelectrica has also been further horizontally unbundled but the privatisation of the generation sector has been delayed. An independent regulatory body, ANRE, has been established and regulatory reform has advanced significantly. The wholesale market has been operating since 2000, although its design was modified in 2005. Its operator, OPCOM, aims to transform it into a regional energy market. The retail market liberalisation is ongoing. Since July 2005 all industrial consumers have been eligible to change their supplier and the market was completely open as of 1 July 2007.

In 2006 the Romanian electricity market comprised:

- 63 Producers, partially regulated;
- 1 TSO (TRANSELECTRICA) – completely unbundled, mainly state owned, fully regulated;
- 1 Market Operator (OPCOM) – state owned, subsidiary of TRANSLECTRICA;
- 8 Distribution network operators/implicit suppliers – fully regulated, of which 5 were private (owned by ENEL, CEZ and E.ON);
- 104 suppliers;
- 8.6 million consumers – of which 8 million residential and 600,000 industrial.

There are three key institutions that are involved in the supervision and regulation of the electricity market in Romania: the Ministry of Economy and Commerce (MEC); the Romanian Energy Regulatory Authority (ANRE) and the Competition Council.

MEC is the administrator of the public assets in the energy sector. It is also the institution responsible for the elaboration of national energy policy and with the implementation of government policy in the energy sector.

ANRE was established in 1998 as an autonomous institution, overseen by the Prime Minister and self-financed. It is headed by a president and vice-president appointed for five years by the Prime Minister based on MEC's recommendation, and by a Council that includes the president, the vice-president and three regulators assisted by a Consultative Council. It has broad regulatory powers with respect to issuing or approving technical and commercial regulations for the companies; establishing the framework for contracting in the sector; setting up prices and tariffs for the captive consumers and for natural monopoly segments of the market; monitoring the power market and the compliance with the regulations; authorising and licensing

[1] Privatisation of the remaining state owned distributors has been for the moment postponed.

companies; elaborating the Commercial Code of the wholesale energy market; and so on. Its general interest decisions are mandatory for the market participants and are published in the Official Journal.

ANRE notifies MEC and the Competition Council with respect to anticompetitive practices. By law[2] the Competition Council is the national authority that monitors market competition and takes measures in order to limit non-competitive behaviour of the firms.

2. Overview of the Romanian Power Sector

2.1 Consumption

The internal final consumption was in 2006 around 41TWh. The share of non-household consumption in total consumption was around 80%, with industry share in total consumption around 60%. For 2006–2009 the consumption is forecasted to grow at an annual rate of 2.5 %. (MEC, 2006)

The 2002 Census indicated that 97% of Romanian households are connected to the electricity network, 99% in the urban areas and 95% in the rural areas. There are regional differences in the network coverage. Moldova is the region with the lowest coverage, 95%.

The consumption profiles in Romania are relatively flat, peaking around 8,00MW.

2.2 Imports and Exports

Romania is a net exporter of electricity. It imports electricity from Serbia, Ukraine, Bulgaria and Hungary. In 2006 it imported around 1TWh. During the same year Romania exported about 5.2TWh through Serbia, Hungary and Bulgaria, which represents around 9.5% of the energy produced. Romanian exports in the region could increase in the near future due to the shutting down of the two 800MW Bulgarian reactors at Kozlodui.

2.3 Generation

Romania's electricity generation is made up of about 10% nuclear, 25-30% hydro, and the remainder thermal generation. Nuclear's share will increase a good deal with the expected completion of the second (and eventually third) reactor at Cernovada, and hydro's share varies to some degree by season and hydrology of the year. Most hydro production is from dams with storage ponds, so that electricity generation may vary according to price signals as well as water flow if that policy choice is made and appropriate institutions are in place. Thermal capacity is around 45% coal, around 45% gas, and the remaining 10% mostly black oil.

More than 50% of the thermo generation and about 30% of total generation is CHP. Most of the CHP plants have very low thermodynamic efficiencies due to severe obsolescence and low capacity factors. The overall efficiency of the Romanian CHP's ranges from 43.5-74% for units with more than 20MW installed capacities to 55.8-

[2] Law 21/1996 published in the Official Journal nr. 88/30.04.1996

92.7% for units with less than 20MW installed capacities (ANRE, 2006). Most of the CHP electricity comes from power plants with installed capacity over 20MW. We do not know the distribution of the generators within these ranges therefore we cannot evaluate the overall efficiency of CHP generation in Romania. However, given the age and obsolescence of the equipment, it is likely that efficiency is low. By international standards, an efficient CHP has global efficiencies (excluding losses) around 75-80%.

The data on installed capacity suggest that Romania still has significant excess capacity and important reserve margins. The installed capacity in 2004 was, according to the Romanian Government, of 18.314MW (MEC, 2006). However, the reserve margin is significantly reduced by the low availability of thermo power plants.[3] The installed capacity figures vary from one source to another and are a very unreliable indicator. In 2003, a very dry year, the national energy system had difficulties in covering the peak load. A part of the existing capacity is going be retired in the next few years. The Romanian Government forecasted (MEC, 2003) that Romania will lose about 8,000MW of capacity until 2015.

Table 1: Electricity Production in Romania, 2001–2005

Electricity production (TWh)	2001	2002	2003	2004	2005
Nuclear generation	5.5	5.5	5.5	5.5	5.5
Thermo generation	33.5	33.4	38.5	34.5	33.9
Hydro generation	14.9	16	13.2	17	20.3
Total	54.6	55.4	57.6	59.6	59.72

Source: INS (2006); MEC (2006)

The voluntary disconnection of households from the centralised systems of production and distribution of heat has negatively impacted cogeneration efficiency in Romania. The low efficiency of CHP generation, the poor state of district heating distribution network and inadequate thermal insulation of the dwellings had generated significant increases in thermal energy bills. Coupled with a policy of maintaining the residential and industrial natural gas prices well under the international levels it led to a trend of switching from centralised systems of distribution to small, sometimes apartment-sized, heating units based on natural gas. The low income segments of the population which could not afford the investment required by these units have simply disconnected their apartments. Some administrative measures have been taken recently in order to limit the ability of households, especially those living in apartment blocks, to disconnect from the heating network. At the same time low income families receive important transfers from the state in order to meet their winter energy bills. However, district heating and its prices remain a delicate political issue.

The details of the restructuring plan for the generation sector are not completely clear. Certainly Nuclearelectrica will remain undivided and in state hands. There has been some discussion of dividing Hidroelectrica into separate enterprises, but it appears now that this will remain a single, government owned enterprise, with private investors invited to build new hydro plants that would remain independent. More

[3] The availability of thermo power plants was only 31.5% in 2002

uncertainty remains regarding how to ensure that consumers benefit from the low costs of most hydro generation in a liberalised market, as we discuss below.

It is in thermal generation that the most uncertainty remains. The Government has announced plans to privatise the large generation complexes at Turceni, Rovinari, and Craiova, though whether these are all three to be privatised *separately* – from each other and from other generation capacity – is unclear. A number of somewhat smaller thermal plants have reportedly been separated from Termoelectrica and are now under the administration of the local and *județ*-level authorities, including Bacau, Onesti, Iasi, Suceava, Brasov, Pitesti, Timisoara, Oradea, Arad, Brazi, Boicesti, Botosani, Focsani, and Bistrita. Some of these were unsuccessfully put up for bids from private investors, and are continuing to seek private participation in investment projects.

In 2006 the structure of the generation sector was as follows:

- 1 nuclear producer: Nuclearelectrica, state owned. Nuclearelectrica operates Romania's only nuclear reactor at Cernavoda. The second 707MW reactor at Cernavodă is expected to come on line this year.
- 1 hydro producer: Hidroelectrica, state owned. Hidroelectrica is the sole administrator of the Romanian hydro resources, and owns 326 hydro power plants and pumping stations. About 40% of Hidroelectrica's generation is accounted for by the two large power plants on the Danube, Portile de Fier I and Portile de Fier II.
- 63 thermo producers, which included:
    - 3 vertically integrated "energy complexes": Turceni, Rovinari, Craiova, state owned, with an installed capacity of 2310MW, 1320MW and 600MW respectively. The complexes were created in 2004 by integrating the brown coal mine previously belonging to the Oltenia National Lignite Company.
    - a big thermo supplier Termoelectrica, state owned, whose power plants account for about 20% of the national installed capacity. Termoelectrica, who owns seven thermo generators, among which the most important are Electrocentrale Bucuresti, Electrocentrale Deva and Electrocentrale Galați.
    - 20 municipal CHP producers;
    - Several independent producers and self-producers, accounting for around 11% of total installed capacity.

Some of the generators, especially Termoelectrica, have encountered severe financial problems in past few years. Termoelectrica had losses of 37 million euros in 2005 and another 17.5 in 2005. The company has accumulated debts of 1.2 billion euros. Two main factors have contributed to this situation: regulated prices that, due political and social affordability reasons, have not covered the generation costs, together with horizontal unbundling measures that stripped away the most efficient generators, like Turceni, Rovinari and Craiova power plants, leaving Termoelectrica with power plants that are obsolete and in need of significant refurbishment. The three power plants have been unbundled without debts, their debts being taken over by Termoelectrica. It is estimated that Termoelectrica needs investment that amounts to 1 billion euros, in order to upgrade, replace or refurbish its generation assets and in order to meet EU environmental standards. The company has been kept floating

through state aid, but since Romania became an EU member this option is no longer available. The Government needs to finally find a viable long-term solution for Termoelectrica.[4]

The larger vision for the thermal sector seems to be a work in progress. An analysis of plans for electricity restructuring commissioned by the regulator ANRE and performed by PricewaterhouseCoopers in 2001–2002 was directed "to assume an appropriate sector structure is in place to provide a sound basis for competition," and its authors proceeded to suggest that "three or four balanced thermal generating companies would be an appropriate split, providing a basis for competition yet a degree of financial strength."

2.4 Transmission

The transport network has been designed for a much higher installed capacity than is currently available and therefore it is relatively uncongested. However, the cross-border transmission capacity is limited.

Transelectrica, a joint stock, 90% state owned company, is the owner of the grid and the TSO. It also provides measuring services on the wholesale market and is the operator of the balancing market. At the end of 2005 Transelectrica had 2,155 employees (Transelectrica, 2006).

About 67% of the national energy consumption is transiting through Transelectrica's grid, 36.35TWh in 2005, the rest being represented by producers directly connected to the distribution network. According to its license, Transelectrica does not have the right to trade electricity, the only allowed transactions being the buying/selling of electricity in order to balance the system and cover the network losses. The Commercial (market) Operator is OPCOM, a subsidiary of Transelectrica.

Romania has external interconnections with Serbia, Bulgaria, Hungary, Moldova and Ukraine. Since 2003, Romania's power grid has also been connected to the European System (UCTE) also. Romania is similarly connected with Hungary, Serbia and Bulgaria. Since January 2005, the export capacity on the Romanian is allocated through monthly and yearly explicit auctions, with some long-term contracts having preemptive allocation. Capacity rights can be transferred and the 'use it or lose it' principle applies (Petrov, 2007).

Transelectrica fixed assets consist of:

- 8,950km of overhead lines, of which there are: 155km of 750kV; 4,639.2km of 400kV; 4,132.4km of 220kV
- 77 electric substations: 1x 750kV; 32x 400kV; 44x 220kV
- 135 main transformer units (34,525MVA)

With respect to the reliability of the transport network, although it needs significant retrofitting, since 2000 there has been no major interruption in the national power grid. Transmission losses are around 2.62% (Petrov, 2007). In order to meet UCTE

[4] Other generators have also accumulated substantial debts. In 2006 the Government issued an Ordinance that erased the debts of 34 companies from the energy sector accumulated before 1 December 2005. However, its application awaits the Competition Council's approval.

standards Transelectrica has made significant investments in order to upgrade and overhaul the network and plans for significant investments in the future.

During 2000–2005 Transelectrica has made investments of 427 million euros in retrofitting parts of the network, new equipment and technologies, software, developing the electricity market platform, new overhead lines etc. For 2006–2013 the value of estimated investments is 627 million euros.

Table 2: Transelectrica, Accidental Events, 2002–2005

	2002	2003	2004	2005
Broken towers	0	0	1	1
Reduction by more than 300MW of power produced in the station	1	4	1	1
Interruption of more than 30 minutes of a consumed power higher than 100MW	0	1	0	0
Other events	924	770	629	738
Total number of accidental events	925	775	631	740

Source: Transelectrica, 2006

Romania has plans to improve its synchronic connection to UCTE by building new overhead power lines and connection points and upgrading the existing lines to 400kV. The work at the new 400KV overhead line Oradea-Nadab-Bekescsaba and the Nadab substation is in progress as well as the upgrade to 400kV of the Gutinas-Bacau Sud-Roman Nord-Suceava line.

Transelectrica also plans to build a new external line with Serbia, the Portile de Fier-Resita-Arad-Timisoara-Vrsat; and a 400kV submarine line between Constanta (Romania) and Psakov (Turkey), in conjunction with the Turkish company TEIAS.

2.5 Distribution

In 2001, the distribution monopoly (Electrica) was split up into eight geographically-based distributors. Since then, five of them have been privatised: ENEL (Italy) gained control over three of them, while the other two are currently controlled by E.ON (Germany) and CEZ (Czech Republic). However, the takeover of Muntenia Sud Distribution Company by ENEL has been delayed due to a corruption scandal linked to questionable privatisations in the energy sector, including that of Muntenia Sud, which involved high officials in the MEC.

The distribution network is obsolete and needs major investments. The distribution losses stand at 14.22% (Petrov, 2007). The network characteristics are presented in Table 3.

Table 3: The Technical Parameters of the Romanian Distribution Network

Operator	110KV Lines	Medium voltage lines	Low voltage lines	Stations 110/MV or MV/MV		Transformer and connection points	
	km	km		nr	MVA	nr	MVA
MOLDOVA	2685,32	17110,96	31113,23	134	4178,6	10,113	2907,84
DOBROGEA	2169,61	11313,7	10743,61	295	5338,37	5,727	2515,91
MUNTENIA NORD	2,160,672	15,374,107	21765,12	208	5419,15	9,157	3031,32
OLTENIA	3,536,754	19,827,084	27142,18	236	7016,2	9,923	3,160
BANAT	2014,72	13,513,702	18419,02	140	4855,1	6,690	2,082,992
TRANSILVANIA NORD	2,140,192	16,687,333	22383,29	114	3916,14	6,182	2,118,053
TRANSILVANIA SUD	2257,29	12883,75	19256,38	109	4095,8	7,142	2359,2
MUNTENIA SUD	784,903	13,311,716	21532,08	60	3667,2	5,676	2,976,976
Total	17,749,461	120,022,352	172354,91	1,296	38486,56	60,610	21,152,291

Source: Electrica, 2003 data

2.6 Retail

Implicitly, until the full opening of the market, distribution companies are also suppliers for both captive consumers and eligible consumers who have not changed their supplier. Also, in 2005, there were 115 licensed suppliers in the retail markets. However, the distribution companies have accounted together for more than 60% of the market.

Currently ANRE establishes unique national tariffs for the captive consumers. Each generator is required to sell a given quantity of electricity at regulated prices. Each supplier of captive consumers is allocated a basket of regulated contracts in which generators have different weights in order that a unique national tariff is achieved.

Captive consumers can choose the most adequate type of tariff for their consumption from a menu of six single and two-part tariffs. However, once they choose they cannot change their option for 12 months.

The National Institute for Statistics publishes each quarter the regulated prices for electricity and heat received from ANRE (INS, 2007). Tables 4 and 5 provide the regulated tariffs for captive consumers as of January 2007. The average prices for standard eligible consumers are not public. The average residential tariff in Romania was below the EU-25 average in 2006.

Table 4: Romanian Electricity Tariffs: Standard Industrial Consumers, 1 January 2007

Standard consumers	Annual consumption	Maximum power	Duration maximum power	Price without VAT	Price, all taxes included
	kWh	kW	Hours	Euro*/kWh	Euro*/kWh
Average**				0.08	0.09
Ia	30000	30	1000	0.10	0.12
Ib	50000	50	1000	0.10	0.12
Ic	160000	100	1600	0.10	0.12
Id	1250000	500	2500	0.08	0.10
Ie	2000000	500	4000	0.09	0.10
If	10000000	2500	4000	0.07	0.09
Ig	24000000	4000	6000	0.07	0.08
Ih	50000000	10000	5000	0.07	0.08
Ii	70000000	10000	7000	0.05	0.06

**The exchange rate published by BNR for 03.01.2007*
***Average tariff: standard tariffs weighted by consumption shares. Authors' estimates.*
Source: ANRE

Table 5: Regulated Electricity Prices: Standard Residential Consumers, 1 January 2007

	Annual consumption		Maximum estimated power	Price without VAT	Price with all taxes included
Standard Consumers	Total	of which by night			
	kWh	kWh	kW	Euro*/kWh	Euro/kWh
Average**				0.08	0.10
Da	600	-	3	0.05	0.05
Db	1200	-	3-4	0.09	0.11
Dc	3500	(1300)	4-9	0.09	0.10
Dd	7500	(2500)	6-9	0.08	0.10
De	20000	(15000)	9	0.07	0.08

**The exchange rate at 03.01.2007*
***Average tariff: standard tariffs weighted by consumption shares. Authors' estimates.*
Source: ANRE

There is a "social tariff" for residential captive consumers, with an annual consumption of less than 600kWh and with a per capita income of less than the national minimum wage. In 2006 about 14% of the residential consumers purchased power at the social tariff.

The tariff is cross-subsidised with the tariffs paid by the residential consumers from the upper consumption levels. The Government estimated that in 2004, the cross-subsidisation amounted to 43 million euros (MEC, 2006). The new Electricity Law stipulates that the protection of vulnerable consumers is to be achieved through transfers from the state budget. ANRE has recently announced that the social tariff will be maintained until 1 July 2007. After this date, the cross-subsidisation of residential tariffs had to be replaced by social transfers. However, further legislation that specifies who qualifies as a vulnerable consumer and how the vulnerable consumers are protected has yet to be produced by the Government.

Romania has a relatively low level of excise tax on electricity compared to the EU countries and has obtained a transition period of three years in order to bring the excise from the 2006 level of 0.3€/MWh to about 1€/MWh.

The structure of the average regulated tariffs varies by type of consumer and voltage. Generation has the highest share in the tariff structure, between 42% and 71% in 2006. We estimated that 'Ib' standard consumers in Romania pay around 40€/MWh for generation. In comparison, generation accounts for less than 30€/MWh in countries like Norway, the UK, Austria, Denmark, Finland, France or Germany.

Nevertheless, the tariffs and the regulated prices that generators receive for the energy supplied to the captive consumers have only become cost-reflective in the past two to three years. As a result of the low regulated prices some producers, like Termoelectrica and Nuclearelectrica, have accumulated significant debts.

The transport tariffs have a weight of 6-10% in the end-user regulated tariffs. In 2006, the transport tariff of Transelectrica was 6€/MWh, rising by more than 20% since 2004. In 2006 the distribution tariffs had been around 31€/MWh for low voltage, 4€/MWh for high voltage and 8€/MWh for medium voltage.

3. Electricity Reform in Romania

The reform of the electricity sector of Romania has been fuelled by the accession negotiations with the European Commission on the Energy Chapter, which started in March 2002 and were closed in 2004. Negotiations have been focused on the build up of emergency oil stocks, nuclear safety and the internal energy market; therefore, Romania's obligation to implement the *acquis communautaire* required adequate legislation as well as functioning markets and institutions. From the very beginning, Romania accepted the entire Community *acquis* in the electricity sector and did not foresee any problems in fully applying it upon the accession.

The legal and regulatory implementation of the *acquis* in Romania's national law has been achieved gradually starting with 1998. Currently, the provisions of European Directives on electricity are transposed in the Romanian legislation.

3.1 Market Opening

The electricity market currently has two sub-markets: the regulated market and the competitive market. The regulated market is the market in which power is supplied to the captive consumers based on regulated contracts at regulated prices.

According to the Electricity Law 318/2003 with its subsequent modification[5] the captive consumers are those consumers who due to "legal, technical or economical reasons are not able to choose their supplier". Presently, only 16.5% of consumers – residential consumers – are captive, in the sense that they are not legally allowed to choose their suppliers From July 2007 all the residential consumers have been

[5] Electricity Law 13/2007 published in Official Journal nr. 51/23.01.2007

formally eligible to change their supplier. Therefore, as of July 2007, the degree of market opening has been theoretically 100%.

However, currently ANRE continues to regulate the tariffs of those consumers who, although legally eligible, do not exercise the right to choose their suppliers. Moreover, the new Electricity Law, 13/2007 stipulates that, as an exception, after the complete opening of the market, ANRE may choose to regulate the prices and quantities of the wholesale contracts concluded between the producers and the suppliers of the residential consumers. In August 2007 the regulator announced that the regulated prices for residential consumers will be kept until 2010 and that from 2008 it may replace the unique national tariffs with tariffs differentiated by distribution region.

3.2 The Market Architecture

3.2.1 The Wholesale Market

The wholesale electricity market has been established since 2000. It was redesigned in 2005 when a "new trading platform" was implemented. Currently the Romanian wholesale market is comprised of the following sub-markets:

- The market for bilateral contracts, operated by the market operator, OPCOM;
- The day ahead market (PZU), a voluntary power exchange, administered by OPCOM;
- The balancing market (BM), a mandatory market, operated by the TSO (Transelectrica);
- The market for ancillary services, operated by the TSO;
- The market for inter-connection capacities, operated the by TSO;
- The market for green certificates, operated by OPCOM;
- The centralised market of forward contracts with physical delivery (PCCF), operated by OPCOM.[6]

The Romanian wholesale market is based on self-scheduling and voluntary participation to the Day Ahead Market.

In 2005 the Centralised Market for Bilateral Contracts (PCCB), an auction market, was introduced in order to facilitate the transactions on the market for bilateral contracts. However, starting from 2007, following a long series of political and financial scandals, the market has been made mandatory for all new bilateral contracts (concluded by the state companies under the control of the Ministry of Economy). In February 2007 the Ministry of Economy also decided that, in order to increase the transparency of the market, the prices of all the energy contracts concluded on the PCCB s will be made public.

Interestingly, OPCOM has recently acquired a competitor: the Romanian Commodities Exchange which has been authorised by ANRE to trade electricity and officially started to trade in February 2007.

The PZU, Romania's day ahead market, is held by the Romanian authorities as one of the most liquid power exchanges in the region, trading around 7.5% of the energy

[6] Started to operate on 15 March 2007.

produced in Romania. OPCOM, its administrator, aspires to become the regional exchange for South East Europe.

The rebalancing market has been highly concentrated, being dominated by the national hydro generator, Hidroelectrica. Therefore, shortly after its introduction in 2005, ANRE imposed price caps differentiated by technology.

So far, due to the very high concentration on the market for ancillary services, these are purchased by the TSO (Transelectrica) through bilateral contracts or regulated bilateral contracts (with Hidroelectrica). System losses are covered exclusively by Hidroelectrica. ANRE has introduced lower and limits to the price at which transactions can take place on this market.

Romania has established a market for green certificates operated by OPCOM coupled with a system of mandatory quotas for suppliers. The producers of green energy receive from the TSP certificates for each 1MWh of energy produced from green sources. The eligible sources of energy are wind, biomass, solar, geothermal, and micro hydro power plants with an installed capacity of 10MW or less that are either new or have been modernised since 2004. Suppliers have to fulfil a mandatory quota determined by ANRE. The green certificates are traded either bilaterally or on the Green Certificates market organised monthly by OPCOM. There is a minimum and a maximum price at which the Green certificates can be transacted, determined by ANRE. In 2005 the minimum price was 24€/MWh and 42€/MWh. The market has not functioned smoothly so far due to the limited number of green certificates available on the market which resulted in many producers being unable to fulfill their quota and suffering the penalties imposed by ANRE.

3.2.2 The Retail Market

The retail market comprises a regulated market, in which the distribution companies supply energy to the captive consumers at prices determined by ANRE, and a competitive market, where contracts are negotiated between the authorised suppliers and the eligible consumers. The regulated market will theoretically disappear starting from July 2007 when all the consumers will become eligible. However, the design of the liberalised retail market and the manner in which it will comply with the 2003/54/EC Directive requirements of universal service is still uncertain.

3.3 Liberalisation of the Retail Supply Market

Implicitly, until the full opening of the market, distribution companies are also suppliers for both captive consumers and eligible consumers who have not changed their supplier.

Data at the end of 2005 (at the mid of that year, all industrial consumers became eligible) show that 552 eligible consumers had already changed their supplier or re-negotiated the contracts. Their share was 42% in industrial consumption and 33% in total consumption, as compared to 24% in 2004. During the same period, the number of licensed suppliers increased from 70 to 112.

3.4 Regulatory Reform

Regulatory reform has made significant progress in Romania. The regulated tariffs for networks are determined based on incentive regulation schemes: revenue cap for

transport and tariff basket cap for distribution networks. The new Electricity Law introduces the concepts of supplier of last resort and vulnerable consumers.

As we mentioned earlier, about 66% of consumption was covered by regulated contracts at regulated prices. However, after the complete market opening in July 2007, the regulated tariffs should disappear, at least for industrial consumers (see section 3.1 above). Presently the regulated supply tariffs are pass-through tariffs that cover all the acquisition costs of the supplier plus a regulated profit of 2.5%.

The generation prices for the energy supplied to captive consumers are also regulated with a rate of return scheme. The real rate of return, based on weighted average cost of capital, is capped at 12%.

By law, ANRE is in charge of monitoring the transparency and competitiveness of the energy market and publishes monthly monitoring reports (which come out with a delay of 3-4 months).

3.5 Privatisation

As shown before, privatisation has advanced substantially in the *distribution* sector. However, government officials have recently announced that the privatisation of the remaining three distribution companies will be postponed indefinitely. In *generation*, privatisation has not started yet. Official declarations currently indicate that the Turceni, Rovinari and Craiova thermal units will be privatised until the end of 2007. Taking into consideration that these units have constantly been in the middle of scandals regarding cheap energy sales towards politically-supported companies, privatisation definitely seems the best solution. However, they account for 25% of the total energy production and, therefore, their behaviour should be closely monitored by ANRE and the Competition Council.

As regards the *hydro sector*, privatisation is envisaged only in the case of several small power units, as sales of assets. Currently, there are no plans to privatise large hydro units, despite, here again, constant scandals for cheap energy sales to selected clients.

3.6 Public Service Provisions

Licensed providers are obliged to ensure public electricity supply services according to licensing conditions.

3.7 The Supplier of Last Resort (SLR)

The new Electricity law has introduced brief provisions with respect to the supplier of last resort (SLR) and the protection of vulnerable consumers that did not exist in the previous law.

The supplier of last resort is designated based on ANRE regulation for up to five years. ANRE has elaborated a project of regulation with respect to the supplier of last resort but had not formally adopted it although the deadline for the designation of the SLRs was 1 July 2007. According to the project the supplier of last resort is selected by auction from a list of potential suppliers that is updated every three years. However, the law mentions that the supplier of last resort could be the supplier that

"supplies electricity to the majority of residential consumers from the license area of each distribution operator".

The market seems to have better information on how the SLR will be designated: last year CEZ announced that it will create a supply company that will have the same shareholder structure as the distribution company Electrica Oltenia with the purpose of both "serving the eligible consumers and the consumers that will not change the supplier as well and fulfilling the obligations of the supplier of last resort." [7]

4. Assessment of the Impact of Reforms

4.1 Market Power and Market Failure Issues in Generation

One of the most important rationales for "vertical separation" of the electricity industry – in the European Union generally and in Romania in particular – is to increase efficiency by creating a competitive generation sector. However, as the experience worldwide has made clear by now, creating competition in electricity generation is not an easy task. Some of the same characteristics of electricity markets that make them fundamentally different from other markets – especially the non-storability of the product, flow externalities across the transmission grid, demand that may be unresponsive to price on a real-time basis, and supply that becomes increasingly inelastic as capacity is approached – also make them vulnerable to the exercise of market power, even when the market is structured in such a way that it appears unconcentrated (Borenstein and Bushnell, 1999; Joskow, 2001 and 2005; Hogan, 2002).

The possibility of restructuring the electricity industry in such a way that the generation sector is controlled by a small number of enterprises is especially troubling in transition and developing countries like Romania, because electricity is an unusually complex industry that requires great sophistication on the part of regulators (Newbery, 2003). Indeed one of the most important tasks facing designers of electricity markets in such countries is to take account of the weak legal and regulatory institutional structures present there, and to structure the new markets in such a way that the demands on these fragile institutions are not beyond their capabilities (Wolak, 2000; Pittman, 2003a).

In Romania the annual values of HHI from 2003 based on both installed capacity and production are moderate with values less than 1,800, although ANRE reports that in May-August the market share of Hidroelectrica significantly increases.[8]

However a generation market that appears competitive because of the presence of a large number of independent generation companies may not be so if so much of the generation is baseload that only a few companies change their output in response to price signals, and therefore determine the price that reigns in a wholesale market. This is one of the lessons of the failed electricity restructuring experiment in California (Blumstein, *et al*., 2002).

[7] Wall Street, "CEZ isi externalizează serviciile," 25 August 2006, www.wall-street.ro
[8] The monthly values of HHI index in the first months of summer are above 2500. Moreover, the market share of the first 4 generators has been over 50% since 2004.

We believe it is interesting to examine the likely competitive structure of the electricity generation sector in Romania from this perspective taking into account the Government's announced plans for restructuring.

We begin with the assumption that the country of Romania will constitute a single "geographic market", as competition law enforcers and regulators use that term, for wholesale electricity. The presence of significant transmission bottlenecks within the country could, theoretically or in the future, lead to the presence of "load pockets" – i.e. regions where wholesale prices might increase in response to increases in demand and supplies from outside were unavailable – and these in turn would likely constitute geographic markets of regional or even local magnitude; however, it appears that such bottlenecks are not present currently, or at expected levels of demand in the near future. (Wolak [2000], for example, points out that transmission levels demand remains considerably below its communist-era levels, and that congestion on the grid is therefore rare.) Similarly, the presence of significant flows of power into Romania from other countries might lead one to define geographic markets at the level of regions larger than the country of Romania, and this indeed seems likely to occur in the future as demand increases and further investments are made in cross-border transmission lines. However, for the present, cross-border transmission capacity is limited in many areas, and Romania is a net exporter of electricity.

We next assume that in Romania, as in all other electricity markets, certain technologies will be primarily "baseload"; that is, their low marginal cost and high adjustment costs render them generally unresponsive to fluctuations in wholesale prices. Nuclear energy is a classic baseload technology, and coal-fired generation, while not so inflexible as nuclear, is usually also treated as baseload. Finally, hydroelectric plants that lack storage ponds – so-called "run-of-river" plants – are also not flexible in response to price signals: they generate electricity when the streams are flowing, and sit idle (or generate less) when they are not (or are flowing at lower levels).

On the other hand, generation plants powered by natural gas and oil generally have higher marginal production costs and are generally more flexible than nuclear, coal-fired, and run-of-river hydro plants, so they are brought into production when wholesale prices rise to high enough levels to make them profitable. In addition, hydro plants with storage ponds may allow water to build up in the ponds during periods of low wholesale electricity prices and then release the water to generate electricity when wholesale prices are higher. (Other factors complicate hydro scheduling decisions, however, including irrigation demands, environmental restrictions, and, related to these two, the ability to forecast future rainfall and stream flows.) Thus hydro plants with storage ponds often may be counted as non-baseload, flexible sources of generation.

More broadly, the distinction between baseload and non-baseload generation capacity is important because for the most part only plants using the latter change output in response to price signals. A generation market that appears competitive because of the presence of a large number of independent generation companies may not be so if so much of the generation is baseload that only a few companies

change their output in response to price signals, and therefore determine the price that reigns in a wholesale market. This is one of the lessons of the failed electricity restructuring experiment in California (Blumstein, *et al*., 2002).

Finally, we assume that the newly designed wholesale electricity markets in Romania will, as in most countries, pay all generators the price of the marginal electricity generated during each period of wholesale price bidding. To the degree that Termoelectrica is eventually restructured into multi-plant generation companies that have both baseload and non-baseload generation plants, this is likely to give an incentive to these companies to withhold output on some occasions when their non-baseload plant is the marginal generator in the market, since in that case their baseload plants will earn the inframarginal rents resulting from any increase in the wholesale price. This problem of anticompetitive incentives is of course not unique to Romania, but it will be one challenge of market liberalisation for the Competition Council and the regulatory agency for the energy sector, ANRE.

In countries such as Romania where hydro plants play an important role in satisfying energy demands, the question of whether and how these plants respond to wholesale price signals – a particularly difficult one to answer if the plants remain state owned – becomes crucial in analysing the likely market outcomes of electricity restructuring.[9] Indeed the significant share of hydro in Romanian electricity generation capacity brings several issues to the fore.

The first, already mentioned, is whether generation sector restructuring will include breaking up the current monolithic hydro generation enterprise, Hidroelectrica, and either creating multiple hydro generation companies or, as some have suggested, allocating this low-cost hydro capacity among different new (generally higher cost) thermal generation companies in an attempt to reduce the average costs of the latter. The principal advantage of maintaining the monolithic Hidroelectrica probably relates to current practice to pay hydro generators only a regulated (cost-based) price for wholesale electricity even if reigning prices in a liberalised wholesale market are much higher, and to allocate the difference between the market and regulated prices in such a way as to keep down the prices paid by final users.

The second issue is the degree to which a hydro generation enterprise or enterprises vary their electricity production in response to wholesale price signals. As noted above, hydro generation schedulers are generally operating subject to multiple constraints, including both irrigation demands and environmental concerns, but if they are profit-maximising subject to these constraints – or indeed if they are government bodies that prefer more revenues to less, as most government bodies do – they may be expected to store water in holding ponds when wholesale prices are low and release water for generation when wholesale prices are high, all else being equal.

Is this a good thing? Should public policy and restructuring decisions encourage it? Most economists would say so. To the degree that private costs reflect social costs, hydro generator behaviour that causes power to be produced at times when wholesale prices are high and high cost gas- and oil-fired generation would otherwise

[9] See, e.g., Arellano (2003) and Atkinson and Halabi (2005).

be called into operation seems unambiguously welfare enhancing. And yet there are dissenting voices to this view.

In particular, a recent study of Russian electricity restructuring by the International Energy Agency (2005) argues that a post-reform, government controlled hydro generation enterprise should take into account demands for water for irrigation and environmental amenities but should not schedule electricity generation in response to wholesale price signals. Why not? The authors fear that a government controlled enterprise could use such a strategy to appropriate the quasi-rents of investors in thermal generation, artificially shaving demand peaks and thus tamping down wholesale prices relative to what they would be with a non-strategic hydro sector. We would argue that this would be a strategy of expropriation only if the Government announced one policy but then pursued the other, but the issue remains one of controversy.

A final issue is the degree to which one or many hydro generation enterprises that are responsive to prices respond in a manner that is welfare-maximising or – where these differ – profit-maximising. This in turn depends in part on whether the hydro enterprise or enterprises have structural market power in generation markets. A hydro enterprise with wholesale market power in particular circumstances may – like any other enterprise with market power – withhold output in order to increase market price. (If there were corruption in the system, it could be paid to do so by other generators.)

Again, in a country like Romania where hydro accounts for an important segment of generation capacity, the particular restructuring policy choices that determine the rules and incentives of hydro generators will play a critical role in determining the degree to which the restructured industry achieves its potential in contributing to Romanian economic welfare.

Let us consider now the likely structure of wholesale generation markets in Romania. Table 1a (Appendix) divides the principal nuclear, coal-fired, hydro, gas-fired, and oil-fired generation capacity into broad categories of baseload and non-baseload, using net output figures for the most recent year available as a proxy for capacity, since the available capacity data are not consistently reliable. The large coal generation complexes at Turceni, Rovinari, and Craiova account for about 10, 10, and almost 7% of production respectively, and the nuclear plant at Cernovada adds another 10%. Adding several smaller coal-fired plants and that portion of hydro that is run-of-river – in particular the large capacity along the Olt River – yields a baseload share of almost exactly half the market.

In non-baseload generation – the portion of the generation sector that will actively determine the outcomes in the wholesale market – two facts immediately stand out. First, over 20% of non-baseload generation – over 10% of all Romanian electricity generation – comes from the seven generation plants controlled by Electrocentrale Bucuresti. That enterprise, then, to the extent that it is participating in the wholesale market rather than simply passively meeting customer demands in Bucharest, may have a significant level of market power, and may, depending on how much marginal costs vary among the plants, have incentives to withhold output in order to earn inframarginal rents on the lower cost capacity. (Such incentives would be all the

stronger if the reorganisation led to a single enterprise controlling these plants and baseload plants as well.)

Second, almost half of the non-baseload generation is accounted for by hydro plants with holding ponds, and over half of this half – i.e., 14% of total Romanian production – is accounted for by the giant hydro plants on the border of Romania and Serbia, the "Iron Gates" (Portile de Fier) plants.

This makes quite clear the crucial future role of Hidroelectrica in the performance of Romanian wholesale generation markets, if we continue the assumption that Hidroelectrica will maintain control of most or all of the existing hydro plants. We do not yet have cost information at the level of individual generation plants. Still it seems almost certain that this flexible hydro capacity, about 24% of total Romanian generation capacity, will have lower marginal generation costs than the thermal non-baseload capacity – probably far lower. This leads to at least four conclusions:

First, on an average, non-winter day – we will discuss seasonal issues in a moment – Hidroelectrica or one of its successor companies will hold the marginal generation capacity, and so have the possibility of affecting the wholesale price, only when demand is low, below 75%of capacity.

Second, if marginal generation costs set wholesale prices, then on this average day there is likely to be a large, discontinuous jump in price as non-baseload hydro capacity is exhausted and non-baseload thermal capacity is called into production.

Third, this means that a profit-maximising hydro generation enterprise could have incentives near this discontinuous margin to withhold capacity, in order to earn inframarginal rents on the capacity that remains active.

Fourth, on this average day, as demand moves into the range that calls thermal non-hydro capacity into production, the ordering of costs of this capacity becomes quite important, as does the ownership of non-marginal capacity by the owners of marginal plants. In particular, if, as suggested by advisors such as PricewaterhouseCoopers, baseload coal plants like Turceni, Rovinari, and Craiova are placed in the same enterprises with higher cost gas- and oil-fired plants, the owners of these enterprises may have strong incentives to restrict the output of their non-baseload plants at the margin.

The situation does not improve when we focus on the winter season, the season of peak electricity demand in Romania. The critical factor here, as in Russia (Pittman, 2005) and other transition economies especially, is that a large percentage of the thermal generation capacity that is generally non-peakload is accounted for by plants that generate both heat and electricity in the winter – so-called CHP (combined heat and power) plants. In Romania as well as other transition economies, these plants are relied upon by the urban populations especially for affordable heating during the winter, and they are not likely to be switched off even if electricity demand were to fall, so that wholesale electricity prices fell.

In the winter, in other words, the gas- and oil-fired CHP plants that had been non-baseload in other seasons become baseload plants. As shown in Table 2a

(Appendix), the effect on the structure of wholesale electricity markets is dramatic. If our assumptions are correct, a full 70% of Romanian generation capacity becomes baseload in the winter. Furthermore, the remaining non-baseload capacity is almost entirely hydro. In fact, according to the information available to us, there are only three generation plants in Romania that are not either nuclear, coal-fired, hydro, or CHP: the large gas-fired plant at Iernut that is a part of Electrocentrale Bucuresti, the smaller gas- and oil-fired plant at Braila, and the small gas- and oil-fired plant at Borzesti.

Two sets of conclusions seem to follow here. First, as in the "average year" analysis, the behaviour and incentives of the hydro generation enterprise or enterprises will be crucial. A profit-maximizing or revenue-maximising Hidroelectrica would have strong incentives to withhold marginal output in order to earn inframarginal rents (to the extent that this capacity is indeed flexible during the winter).

Second, the ownership of the three non-CHP, non-coal, hydro plants becomes crucial as well. If this analysis is correct, then on almost any cold winter day a generation enterprise that owned coal or CHP plants in addition to one of these three would have strong incentives to withhold output to raise the wholesale price.

This examination and analysis of the structure of wholesale electricity markets in Romania under current assumptions and reform plans suggests that there may be real problems with the presence of market power among generation companies and incentives for the companies to exercise that market power.

The relatively high reserve margin that exists in Romania in a typical year, the low installed capacity of the peakers and the relatively flat profile of consumption in Romania are factors that may significantly attenuate the consequences of this type of behaviour. Nevertheless, the excess capacity will be dissipated in the near future as unprofitable generators will have to be closed and as electricity consumption will gradually increase.

Therefore, on medium run the entire broad exercise raises a fundamental question: if baseload generation accounts for fully half of Romanian generation capacity – more during the winter, and more in the future as Cernovada-2 and Cernovada-3 come into production – and if low-cost hydro generation accounts for another quarter, how much is likely to be gained from the creation of wholesale generation markets? This question seems especially relevant in light of a) the danger of new wholesale markets creating problems of the exercise of market power (as emphasised by Pittman, 2003b) and b) the very high costs involved in creating the complex institutional structure of such a market (as emphasised by Wolak, 2000).

But if we add to earlier assumptions the assumption that this reform train has already left the station, there remain a number of policy decisions with the potential to determine whether and how much Romanian electricity customers suffer from the exercise of market power in the generation sector.

The first and most obvious policy decision concerns the continued development of regional generation markets within the SEEREM framework. Our analysis has been based on the assumption of Romania as the relevant geographic market for the

analysis of generation market structure. To the degree that internal and external transmission linkages are strengthened and wholesale electricity imports and exports become much more important components of Romanian electricity transactions, the structure of an artificially small geographic "market" is no longer of interest. Stated another way: attempts by Romanian generation companies to restrict output in order to increase wholesale prices would be defeated by imports – and thus the Romanian companies would give up on such attempts.

A second decision, or set of decisions, concerns the treatment of hydro generation in the restructured wholesale sector within Romania. Romanian policy-makers have debated ways to ensure that the public benefits from the low marginal costs of hydro generation. One solution might be to auction off ownership of the existing hydro plants and then allow the new owners to participate without special regulation in wholesale markets; a fair and competitive auction process should insure that the Romanian public treasury receives the discounted present value of the quasi-rents available. However, this market-oriented solution seems not to have been seriously considered. One alternative apparently still on the table, as mentioned above, is the inclusion of hydro plants in the mix of generation plants separated from Termoelectrica and privatised, in order to lower the average cost of generation for the new generation enterprises; unfortunately, it is not clear why lowering average cost would affect the marginal costs and incentives of these new market players.

The policy option apparently in the ascendancy at present is to regulate the wholesale price of hydro generation – using some form of rate-of-return regulation or price caps based on current low marginal costs of generation – and then to divide this low-priced hydro power among the eight regional electricity distribution companies in order to lower *their* average costs and hence their (regulated) prices. Though this is obviously a highly "regulatory" solution, it does have the (apparent) advantage of removing any incentives for Hidroelectrica or successor companies to exercise market power in the generation sector. On the other hand, as markets for final users are gradually opened to competition and deregulated, the continued role of this regulatory solution is not clear.

A third important policy issue concerns long-term contracts between generators and final customers (and/or supply companies). Long-term contracts have the potential to alleviate or remove the incentives for anticompetitive behaviour by generation companies, because to the degree that prices are set by the contracts, a generator does not benefit from that portion of its output from any increases in wholesale prices. Thus in general electricity market reformers have encouraged the use of long-term contracts between, for example, individual generators and large industrial and commercial customers. However, there is a downside to this strategy (beyond the reliance on the *enforcement* of long-term contracts in a country where the court system continues to recover from its communist past): too many long-term contracts can so reduce the liquidity of short-term wholesale markets that they can no longer serve as the basis of market operation. This has reportedly been a problem in the UK, where the combination of long-term contracts and vertical re-integration (between generation companies and supply companies) has left spot markets with very little capacity to allocate.

4.2 The Predicted Impact of Different Reforms on Consumers

In the short- and medium-term we will likely witness an increase in end-user electricity prices due to:

- the abandonment of regulated prices, at least for industrial consumers;
- significant investment costs needed to replace obsolete fixed assets in the industry;
- a change in the behaviour of generators, from unclear objectives today towards profit-maximisation sometimes in the future;
- possible increase in the market power of non-baseload units, due to a decrease in excess capacity and higher demand for electricity;
- potential increases in the costs of nuclear energy, due to internalisation of waste disposal or decommissioning costs;
- increase in the generating costs due to internalisation of environmental costs;
- increase in generation costs due to promotion schemes for renewables;
- increases in the supply tariffs, due to both low current margins and to gradual internalisation of costs associated with the future unbundling between distribution and supply.

So far, the rents accruing to some generators (especially hydro) have been allocated by the regulator in order to keep the regulated prices low. Once the regulated prices are abandoned these rents are likely to remain entirely in the hands of these generators. Actually, in the past two to three years the regulated prices have been driven up by the fact that the regulator has allowed Hidroelectrica and other low-cost producers to sell an increasingly larger share of their production on the competitive market. That meant that more expensive generators had to replace Hidroelectrica in the regulated basket of contracts used to determine the captive consumers' tariffs.

What will happen with the rents accruing to generators like Hidroelectrica and Nuclearelectrica in the future is uncertain. Unfortunately, given the experience of the past few years, there is a significant risk they will be dissipated in the pockets of politically influential groups. The scandals that have plagued the Romanian electricity sector for a few years now revealed how these groups have made a fortune by securing contracts with state owned companies like Hidroelectrica and Enegy Complexes (Turceni, Rovinari) at very low prices and re-selling the energy to eligible consumers at the market price.[10]

Competition in the generation sector is unlikely to cause a reduction in the wholesale prices in the short or even medium run despite the sector's medium concentration. This is because concentration on the generation sector is only one necessary condition for a competitive electricity market. There is no guarantee that the state owned companies will behave competitively and the recent scandals in the sector suggest that they are likely not to. Privatisation could be a way of capitalising the benefits of liberalisation because it could stimulate the firms to behave competitively.

[10] The story is a little bit more complex, though. Between 2002 and 2004 some suppliers managed to negotiate long-term contracts with Hidroelectrica, Nuclearelectrica or energy complexes at prices that were significantly higher than the regulated prices that the two companies received from their regulated contracts. As mentioned above, the regulated acquisition prices received by the generators from the distributors have only recently become cost-reflective. However, the prices were most likely lower than the prices prevailing at the time on spot market. The share of these contracts in the market is currently around 30% but is expected to decrease sharply in the next few years.

In the longer-term, however, prices may decrease due to:

- efficiency gains in generation, transport, distribution, and supply stimulated by privatisation, incentive regulation and a competitive wholesale market;
- improvements in asset management;
- a decrease in the distribution margins (currently relatively high)

4.3 Environmental Consequences

Presently only a small part of the environmental costs are internalised by the energy sector. The Romanian Government estimates that the gradual internalisation of environmental costs will increase the generation cots by 2-3€/MWh in the next five years. (Romanian Government, 2005)

The promotional schemes for renewables will lead to increases in the final consumer's tariffs as well. The estimated increases for 2007 range between 0.9 and 1.57€/MWh (Sandulescu, 2005).

5. Political Issues

In 2006 the European Commission noticed with respect to the Romanian energy sector:

> the [Romanian] Government resumed its practice of large debt cancellations by deciding to erase debts of more than 1% of GDP of a main energy supplier without presenting convincing restructuring measures. Unpaid bills remain endemic in the energy sector. In order to create a level playing field for business, financial discipline should be strengthened. (EC, 2006)

As shown earlier (see section 2.3), one of the generators – Termoelectrica – registered constant losses and had an accumulated debt of 1.2 billion Euros at the end of 2005, due to regulated prices lower than its costs and to horizontal unbundling measures that left it without its most efficient generation units.

In order to keep it alive, the Government provided several state aids during 2002–-2006, in the form of public debt write-offs and subsidies for debt repayment towards private creditors, of more than 1 billion Euros. In accordance with the pre-accession procedure, the aids have been authorised by Romania's Competition Council as being compatible with the *acquis communautaire* because they represented compensations to an undertaking operating a service of general economic interest. However, these authorisation decisions raised many questions about their conformity with the European legislation. As an example, if the undertaking which is to discharge public service obligations is not chosen pursuant to a public procurement procedure, which would allow for the selection of a tenderer capable of providing those services at the least cost to the community (which was not the case for Termoelectrica), then the level of compensation needed must be determined based on an analysis of the costs of a typical undertaking, well run and adequately equipped. Or, in this case, the involved costs were Termoelectrica's costs, probably substantially higher than those of a "typical undertaking" in the sector.

However, after accession, state aids should be notified to and authorised by the European Commission. It is doubtful that the Commission will agree anymore with any new state aid and therefore it becomes crucial for this company that a decision is made about its prospects in the market. In a more general way, due to this change in state aids authorisation procedures, adjustments in Romania's economy, including the energy sector, will probably be severe and are expected to happen in the near future.

However, with respect to tariff rebalancing in the electricity sector, this has been to a large extent completed in the sector, and we do not expect important political consequences in the future. In general, consumer organisations have not been involved in the sector reform. The only significant consumer pressure group has been that of large, energy-intensive industrial consumers, such as the aluminium producer Alro.[11] Some of them have already managed to secure long-term contracts between 2002–2004 on the unregulated market at favourable prices [12] (Alro, Lafarge, Azomures) but also have been pressuring the Government for preferential electricity contracts. Most of the 2007 estimated production of Hidrolectrica, for example, is already contracted by energy traders and large industrial consumers. However, the Minister of Economy, Varujan Vosganian, has recently declared that there will be no tariff facilities granted to large industrial electricity consumers.

6. Conclusions

As a general conclusion, Romania has made significant progress in the implementation of the *acquis communautaire*, being ahead of several older member states in certain areas of electricity sector reform. However, competition is still weak, mainly in the generation sector. There is a certain degree of competition in supply and trading of electricity, but substantial scandals of corruption and bribery have constantly accompanied the liberalisation process.
During the last years, several strategies for the energy sector have been made public by successive governments. The current one is also working to a new strategy which is supposed to be finalised by May 2007. Several issues may be discussed on the basis of these strategies:

- in most of the cases, economic analysis and reasons to support proposed measures are lacking. There is no cost-benefit or sensitivity analysis and, often, basic economic issues of the energy sector are not taken into consideration, to say the least. Strategies are usually designed/decided by "insiders" with vested interests in the sector;
- the objectives mentioned in the strategies are usually too numerous, suggesting the wish to formally comply with certain commitments, but not real determination to meet them; for instance, creation of competition in generation is mentioned on the paper, but is not yet supported by real measures, like privatisation;
- being so many, the objectives are sometimes in conflict, like ensuring the security of energy supply and lower prices for final consumers, without any prioritisation in place;

[11] Alro is the largest electricity consumer in Romania, accounting for 8% of the total consumption.
[12] Recently, the spot market price on OPCOM has risen to about 60€/MWh. According to unofficial sources the contracts for hydro energy were concluded at prices below 25€/MWh.

- there is no clear decision on what will happen with several obsolete units which are artificially maintained and contribute to an increase in production costs; Romania already has higher prices than the EU average for industrial consumers, which hinders the competitiveness of domestic companies;
- periodically, strategies and/or official statements promote the idea of changing the structure of the generation sector by organising several (usually three) units including all types of energy (thermal, hydro and nuclear). The mentioned reason is to promote competition between similar companies (both as market shares and costs but, in fact, they aim to support several loss making capacities in the sector. Errors in the understanding of basic economics (like the difference between average and marginal costs) and of pricing in the energy sector are probably at the basis of such proposals. The consequences of these re-consolidations on market competition are usually not understood or factored in.

Current scandals in the sector show that, taking horizontal unbundling and the sector's liberalisation as given, the model of combining state owned non-competing generators with private/privatised distributors and suppliers is not the best model of market structure. Public units have other objectives than profit maximisation (security of generation, lower prices, etc.) and are under strong political control. In such a model, corruption would always be an issue, even if transparency is maximised or the sector is totally de-politicised. Once again, creating competition in generation by allowing private interests to get involved appears as vital. As until now there had been no private green field investments, the solution could come from the privatisation of existing units.

Obviously, many decision-makers are worried or even scared about such a solution, taking into consideration the strategic nature of the sector. Therefore, strengthening the role and the cooperation between the professional regulators in the sector (ANRE – for technical and economic issues, and Competition Council – for controlling market power) is very important in order to dissipate such worries.

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Appendix

Table 1a: The Structure of the Romanian Generation Sector

POWER STATION	NET OUTPUT	NET OUTPUT SHARE (%)	TECHNOLOGY	COGENERATION	CNOS* (%)
			Base-load group		
TURCENI	5297923	10.25	brown coal	NO	10.25
ROVINARI	5245301	10.15	brown coal	NO	20.41
SNN	5142397	9.95	uranium	NO	30.36
OLT	2696000	5.22	other hydro		35.58
ISALNITA	2677667	5.18	brown coal	NO	40.76
RAAN	1367142	2.65	brown coal	YES	43.41
CRAIOVA II	748805	1.45	brown coal	YES	44.86
OTHERS	678000	1.31	other hydro		46.17
GOVORA	581091	1.12	brown coal, nat gas, black oil	YES	47.29
SIRET	423000	0.82	other hydro		48.11
ARAD	297311	0.58	brown coal	YES	48.69
ORADEA	265850	0.51	brown coal	YES	49.20
BACAU	215059	0.42	brown coal	YES	49.62
DOICESTI	194920	0.38	brown coal	NO	49.99
BRASOV	191023	0.37	brown coal	YES	50.36
PRUT	70000	0.14	other hydro		50.50
JIU	49000	0.09	other hydro		50.59
			Non-base-load group		
PF I	5692000	11.02	hydro with holding ponds		61.61
DEVA	3317992	6.42	pit oil	YES	68.03
BUCURESTI (LUDOS IERNU	2055694	3.98	nat gas	NO	72.01
BUCURESTI (SUD)	1543069	2.99	nat gas+black oil	YES	75.00
PF II + GOGOSU	1501000	2.91	hydro with holding ponds		77.90
LOTRU	933000	1.81	hydro with holding ponds		79.71
GALATI	853894	1.65	nat gas+black oil	YES	81.36
BUCURESTI (VEST)	827925	1.60	nat gas+black oil	YES	82.96
BISTRITA	775000	1.50	hydro with holding ponds		84.46
ARGES	715000	1.38	hydro with holding ponds		85.85
BRAILA	681508	1.32	nat gas+black oil	NO	87.17
SOMES	648000	1.25	hydro with holding ponds		88.42
PLOIESTI	553902	1.07	nat gas+ black oil	YES	89.49
IASI	547943	1.06	brown coal, nat gas, black oil	YES	90.55
SEBES	526000	1.02	hydro with holding ponds		91.57
RAUL MARE	512000	0.99	hydro with holding ponds		92.56
BUCURESTI (PROGRESUL)	456391	0.88	nat gas+black oil	YES	93.45
DRAGAN	420000	0.81	hydro with holding ponds		94.26
CERNA	373000	0.72	hydro with holding ponds		94.98
BUCURESTI (PALAS, CONS	329233	0.64	nat gas+black oil	YES	95.62
SNP-PETROBRAZI	327233	0.63	natural gas	YES	96.25
BUCURESTI (GROZAVESTI	293154	0.57	nat gas+black oil	YES	96.82
PITESTI	270292	0.52	nat gas+ black oil	YES	97.34
ONESTI	238805	0.46	nat gas	YES	97.80
BORZESTI - K	237814	0.46	nat gas+black oil	NO	98.26
SUCEAVA	220055	0.43	pit oil	YES	98.69
PAROSENI	192803	0.37	pit oil	YES	99.06
BISTRA	148000	0.29	hydro with holding ponds		99.35
BUZAU	141000	0.27	hydro with holding ponds		99.62
GIURGIU	90332	0.17	pit oil	YES	99.80
DAMBOVITA	59000	0.11	hydro with holding ponds		99.91
RAUL TARGULUI	31000	0.06	hydro with holding ponds		99.97
BUCURESTI (TITAN)	14269	0.03	nat gas+black oil	YES	100.00

Source: ANRE

Table 2a: The Structure of the Romanian Generation Sector: Winter Net Output

POWER STATION	NET OUTPUT	NET OUTPUT SHARE (%)	TECHNOLOGY	COGENERATION	CNOS (%)
			Base-load group		
TURCENI	5297923	10.25	brown coal	NO	10.25
ROVINARI	5245301	10.15	brown coal	NO	20.41
SNN	5142397	9.95	uranium	NO	30.36
DEVA	3317992	6.42	pit oil	YES	36.78
OLT	2696000	5.22	other hydro		42.00
ISALNITA	2677667	5.18	brown coal	NO	47.18
BUCURESTI (SUD)	1543069	2.99	nat gas+black oil	YES	50.17
RAAN	1367142	2.65	brown coal	YES	52.81
GALATI	853894	1.65	nat gas+black oil	YES	54.47
BUCURESTI (VEST)	827925	1.60	nat gas+black oil	YES	56.07
CRAIOVA II	748805	1.45	brown coal	YES	57.52
OTHERS	678000	1.31	other hydro		58.83
GOVORA	581091	1.12	brown coal, nat gas, black oil	YES	59.96
PLOIESTI	553902	1.07	nat gas+ black oil	YES	61.03
IASI	547943	1.06	brown coal, nat gas, black oil	YES	62.09
BUCURESTI (PROGRE	456391	0.88	nat gas+black oil	YES	62.97
SIRET	423000	0.82	other hydro		63.79
BUCURESTI (PALAS, C	329233	0.64	nat gas+black oil	YES	64.43
SNP-PETROBRAZI	327233	0.63	natural gas	YES	65.06
ARAD	297311	0.58	brown coal	YES	65.64
BUCURESTI (GROZAV	293154	0.57	nat gas+black oil	YES	66.20
PITESTI	270292	0.52	nat gas+ black oil	YES	66.73
ORADEA	265850	0.51	brown coal	YES	67.24
ONESTI	238805	0.46	nat gas	YES	67.70
SUCEAVA	220055	0.43	pit oil	YES	68.13
BACAU	215059	0.42	brown coal	YES	68.55
DOICESTI	194920	0.38	brown coal	NO	68.92
PAROSENI	192803	0.37	pit oil	YES	69.30
BRASOV	191023	0.37	brown coal	YES	69.67
GIURGIU	90332	0.17	pit oil	YES	69.84
PRUT	70000	0.14	other hydro		69.98
JIU	49000	0.09	other hydro		70.07
BUCURESTI (TITAN)	14269	0.03	nat gas+black oil	YES	70.10
			Non-base-load group		
PF I	5692000	11.02	hydro with holding ponds		81.12
BUCURESTI	2055694	3.98	nat gas	NO	85.09
PF II + GOGOSU	1501000	2.91	hydro with holding ponds		88.00
LOTRU	933000	1.81	hydro with holding ponds		89.81
BISTRITA	775000	1.50	hydro with holding ponds		91.31
ARGES	715000	1.38	hydro with holding ponds		92.69
BRAILA	681508	1.32	nat gas+black oil	NO	94.01
SOMES	648000	1.25	hydro with holding ponds		95.26
SEBES	526000	1.02	hydro with holding ponds		96.28
RAUL MARE	512000	0.99	hydro with holding ponds		97.27
DRAGAN	420000	0.81	hydro with holding ponds		98.08
CERNA	373000	0.72	hydro with holding ponds		98.81
BORZESTI - K	237814	0.46	nat gas+black oil	NO	99.27
BISTRA	148000	0.29	hydro with holding ponds		99.55
BUZAU	141000	0.27	hydro with holding ponds		99.83
DAMBOVITA	59000	0.11	hydro with holding ponds		99.94
RAUL TARGULUI	31000	0.06	hydro with holding ponds		100.00