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Double Trouble

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Why Romania should drop plans to create two national energy champions

By Razvan Grecu

Acknowledgements

Many thanks to Candole analysts Valentina Ivan, Martin Bebiak and Ivan Kotev for their help in researching this study, and to those from the Romanian energy establishment who shared their thoughts with me. Special thanks to Jan Ondrich for his untiring guidance and to James de Candole for his invaluable contribution to editing the text.

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January 2011

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INTRODUCTION

In this study, we demonstrate that Romanian government plans to merge most of Romania's electricity generators and coal mining firms into two vertically integrated firms, to be called Hidroenergetica and Electra, will destroy the nascent competitiveness of the country's electricity market.

We begin by explaining why competitive markets are important, most importantly because they lower prices and maximise consumer, rather than producer surplus. We then demonstrate that the generation sector will be controlled by the two planned firms, leaving little space for competition. We go on to show that the market structure in the generation sector will be replicated in the other markets, most notably in the balancing market and the trading sector. We argue that market concentration will increase wholesale electricity prices and maximise profits of the duopoly at the expense of consumers and other market participants. We briefly explain the real reasons behind the policy of creating two national champions. And finally, we sum up our findings and recommend a way forward.

THE IMPORTANCE OF COMPETITIVE MARKETS

Competition may be considered an essential part of any functioning market, and the electricity industry is no exception. Various studies show that a concentrated market structure leads to market failure and harms final consumers. California's electricity crisis in 2000/2001 is often given as an example. Borenstein et al. (2002) show that lack of competition in this case led to a sharp increase in electricity prices. Inadequate competition created deadweight losses due to production inefficiencies and resulted in a transfer of wealth from consumers to producers. Similar studies have been conducted in Europe. Bower (2002), and Fabra and Toro (2004) use regression analysis to show that the reduction of mark-ups in England was caused by a significant decrease in the concentration of the electricity market. These studies allow one to conclude that competition enables a more efficient use of resources, strengthens incentives to create new technologies and guarantees lower prices, leading to higher consumer welfare.

Market power may be defined as the ability of dominant firms to raise prices over market equilibrium prices and maintain them there for a significant period of time. Economic literature and merger guidelines issued by international or national agencies argue that market power is detrimental to competition and market development, even if such power is not exercised by dominant firms. Guidelines on horizontal mergers issued by the Federal Trade Commission state that "when evaluating a consummated merger, the ultimate issue is not only whether adverse competitive effects have already resulted from the merger, but also whether such effects are likely to arise in the future. Evidence of observed post-merger price increases or other changes adverse to customers is given substantial weight." The guidelines stress that a consummated merger may be anticompetitive "even if such effects have not yet been observed, perhaps because the merged firm may be aware of the possibility of post-merger antitrust review and moderate its conduct. Consequently, the Agencies also consider the same types of evidence they consider when evaluating unconsummated mergers." (FTC's Guidelines for Horizontal Mergers, 2010)

High market concentration and its effect, high market power for the incumbent firms, harms competition for two reasons. The first reason is that incumbent firms may manipulate supply on the relevant market to extract windfall profits from consumers. Market collusion on markets with few relevant firms is profitable due to low coordination costs. On the other hand, markets with structures similar to perfect competition have high coordination costs, making collusion an unprofitable strategy. Such manipulative behaviour is peculiar to the electricity sector, where demand is inelastic: Electricity cannot be stored efficiently and must be consumed in real time. Furthermore, domestic supply is constrained by transmission capacity and regional markets lack integration because of insufficient interconnection capacities.

The second reason is the inefficient functioning of the market when few firms with high market power compete for profits. Models of competition (Cournot) argue that inefficient allocation of quantities and prices are likely to occur when the market is dominated by few (oligopoly) firms with high market power. Moreover, there are market incentives for oligopolists to form cartels or to collude tacitly at the expense of consumers (Borenstein and Bushnell, 1999). Cournot models of competition are relevant for the electricity sector because of underlying assumptions about markets

and competition. Cournot models assume that firms are profit seekers, there is no product differentiation on the market, firms have market power (the decision to supply or not to supply the market by one firm affects the price of the respective good) and firms compete by choosing simultaneously quantities to be delivered on the market at a certain price.

Welfare loss from a duopoly

Two outcomes are predicted by modelling the markets in such a way. First, outputs supplied on the market are lower (shortage of goods) than in the case of perfect competition. Second, prices in a duopolistic market with high market power firms are higher than in markets with perfect competition.¹ (Tirole, 1988) This problem is illustrated below.

Chart 1: Cournot's duopoly competition model

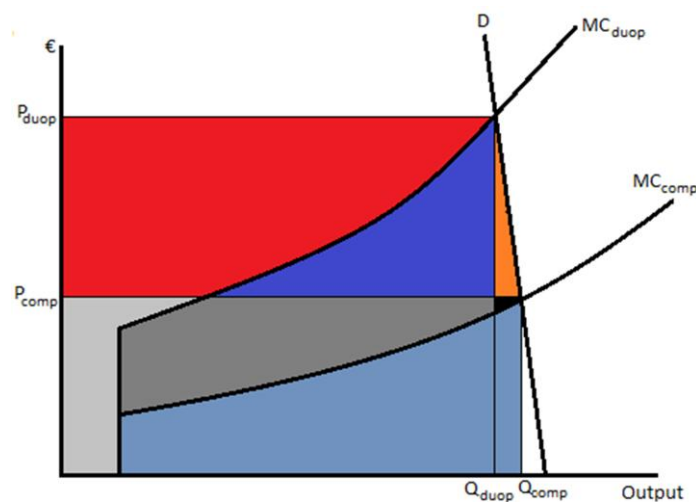


Chart 1 illustrates the welfare loss that results from creating a duopoly of the kind being proposed by the government of Romania. It shows two marginal cost curves, one faced by companies under competition, the other faced by the duopoly, and the inelastic demand curve both are confronted with. The shape of the marginal cost curve is explained by the increase of total variable costs as output increases and more units must be put into operation. We simplify the model here and assume hydro plants have no variable costs, while coal and gas units have the highest variable costs. Under competition, the costs of the companies are the light blue area, while the light, dark grey and black areas are the rents earned by those companies. By creating a duopoly, total variable costs increase due to inefficiencies of production. These are represented by the dark grey and dark blue areas. Due to abuse of market power, the rent earned by the duopoly will increase by the area coloured red. As a result, consumers will pay a higher price for the final good. Additionally, the country will suffer a welfare loss, represented by the orange and black triangles. This welfare loss is the additional

¹Markets with numerous relevant market players.

amount of electricity consumed at a lower price in a competitive market. This additional electricity would not exist in a market dominated by the duopoly.

Empirical studies of electricity markets support these predictions. Analyses of European electricity markets have shown that quantities supplied to consumers are significantly lower than in the case of perfect competition, resulting in insignificant mark-ups for electricity firms. (Wolfram, 1999; Green and Newbery, 1992) London Economics made an analysis of selected European electricity markets. One of its findings is the considerably higher price mark-ups in concentrated markets (France with 149.6% in 2005) compared to countries with lower market concentration (Germany with 15.2% in 2005) (London Economics, 2007).

A European Commission inquiry into the EU energy sector has highlighted significant deficiencies in the way electricity markets function. The inquiry showed that electricity generation sectors remain highly concentrated and national in their scope. Electricity generators have the ability to withdraw electricity generation capacities in order to increase electricity prices. Market concentration is reinforced through long term contracts. High market concentration in the generation sector is reflected in the downstream business, especially in wholesale electricity trading.

The EC inquiry found that vertical foreclosure (vertical market power) leads to suboptimal supply of electricity to the wholesale market. Low liquidity of the wholesale electricity market reinforces the market power of incumbent firms (who control most of the generation assets) and is a significant barrier for new entrants.

In addition, the inquiry found that market integration (cross border trade) does not represent significant protection from market concentration due to insufficient interconnection capacities. It found that regulated contracts and the size of the regulated markets are harmful to market competitiveness. It concluded that long term supply contracts and high market power in the generation sector limit competition in the retail sector. And it established that balancing markets are controlled by incumbent (usually vertically integrated) firms. Balancing fees are unjustifiably high and often favour the incumbent against new entrants.²

² DG Competition report on energy sector inquiry, 2007.

MARKET CONCENTRATION IN GENERATION

Here we argue that the duopoly in the electricity generation sector being proposed by the Romanian government would increase prices and deter potential new market entrants. Hidroenergetica and Electra would have sufficient available capacities to meet the electricity (baseload and peakload) demand in the short and medium run, leaving little space for outside competition, in particular considering low variable costs of Hidroelectrica's and Nuclearelectrica's legacy assets. The duopoly will have incentives to prevent entry of new market participants by a behaviour known as vertical foreclosure, through its control of coal mines. We shall now examine the consequences of the duopoly's potential exercise of dominant market power in two areas: horizontal (in one segment of the supply chain) and vertical (along the supply chain).

Horizontal market power in the generation sector

Dominant incumbents and the potential for market abuse

If a firm enjoys significant horizontal market power, it is able potentially to curb competition and increase prices. Here we refute the government's claim that the formation of the two vertically integrated firms would increase competition in the generation sector. We argue that the duopoly would introduce a significant impediment to effective competition in the electricity generation sector, leading to higher wholesale prices and lower investment.

The government claims that the current market structure, with electricity generators divided according to fuel mix, provides no solid basis for competition. The official reasoning is that competition is hindered because coal- or gas-fired generators with high marginal costs cannot compete with the more efficient Hidroelectrica and Nuclearelectrica. The government argues that its proposed restructuring of most state-owned generation assets will not hinder competition, giving three reasons.

The first is the increase of forecasted electricity production to some 90TWh by 2020, from less than 57TWh in 2009. Most of the additional production, the government says, is expected to be generated by private generators. The second reason is the planned divestment of obsolete generation assets by the incumbent firms, especially in the coal and gas generation fleet, which would allegedly create demand for new generation assets. The third reason is that new generation sources are expected to go on-line by 2017. These are Cernavoda nuclear reactors 3 and 4 (EnergoNuclear), Galati (Enel, CEZ), Braila (Enel, E.ON), Doicești (Mechel) and the promised 3,000MW of wind.

We disagree. To demonstrate the effects the proposed duopoly would have on the generation market, we compute the residual supply index (RSI) of EU countries based on installed capacities and estimated demand for electricity.³ The RSI has become the standard yardstick in measuring

³ Data on the installed capacities were collected from EIA, 2007. The electricity demand (in MW) in 2007 was calculated from total consumption provided by EIA for EU-27, divided by 8,600 hours.

competitiveness of electricity markets in recent years.⁴ It measures the capacity of generators to supply market demand by excluding the available capacities of the dominant firm. The RSI shows the degree to which fulfilment of electricity demand depends upon the largest generator. The higher the RSI, the less concentrated the electricity market. To validate our calculations, we computed the Herfindahl-Hirschman Index (HHI) based on the installed capacities of the three largest generators and ran correlation analysis for the two indices.⁵ The correlation coefficient between the RSI and HHI indicators is negative and as expected, statistically very significant ($r = -0.83^{***}$).⁶

The results show that the creation of the two vertically integrated firms will significantly decrease competition on the generation market. Chart 2⁷ below shows the distribution of EU countries as a function of the total installed capacities (year 2007) and their residual supply indices.

In the current market structure, Romania has one of the highest RSI values (about 2.5), which indicates a rather competitive market. We modelled the evolution of market structure after the creation of the duopoly in two steps. First, we computed RSI based on total installed capacity (about 20TW) and the largest generator (Hidroenergetica, with some 8,000MW of installed capacity). As a result, RSI dropped by about 1 point (see green arrow in Chart 2 below). Second, we computed a second RSI value by using the installed capacities of the two firms. RSI dropped below 1, suggesting the two firms would be pivotal and the remaining generators would not be able to supply the demand.⁸ In other words, from being one of the least concentrated markets in Europe, Romania would become one of the most concentrated. Since both firms would be controlled by a single government agency, it is reasonable to expect the market to become quasi-monopolistic, with no real competition between the two generators, as well as a high probability of price collusion.

The expected horizontal market power of the two firms is depicted in Chart 3 below. The chart shows how much of the electricity demand is covered by the two national champions in peak (winter) and off-peak (summer) seasons. To create the chart, we subtracted the average hourly demand (in MW) from the available capacities of the two firms.

The chart shows that the two firms have enough capacity to cover demand in summer and winter. Hidroenergetica and Electra combined will have an average surplus available capacity of about 6,000MW to cover the hourly peak demand in winter. The average surplus available capacity to meet the hourly peak summer demand is about 7,500MW, almost twice as much as the remaining

⁴ For a comprehensive review of RSI in the electricity market, see "Modeling EU Electricity Market Competition Using the Residual Supply Index", Recent Research from London Economics-Global Energy Decision/Ventyx and the DG Competition, February 2008. Working Paper. London Economics.

⁵ In this report, we calculate HHI based on available installed capacity of three largest generators in order to replicate the methodology for analyzing market concentration in electricity generation and trading sectors used by the Romanian regulator.

⁶ The correlation coefficient is negative because of the different relationships between RSI and HHI. Since HHI is computed as the sum of squares of market shares, high HHI suggests that the market is very concentrated. On the other hand, high RSI shows that the remaining generators are able to supply the electricity demand even if the capacity of the largest generator is not available.

⁷ Baltic and Nordic countries were counted as a single group since their electricity markets are highly integrated.

⁸ A generator becomes pivotal on the market if the demand cannot be satisfied without the generator's supply.

available capacity, which is not incorporated into Hidroenergetica and Electra.⁹ Baseload (hydropower and nuclear) available capacities of the two firms can fully cover electricity demand in summer and off-peak demand in winter (the hours 1am-7am). Furthermore, the average hourly additional available capacity which is necessary to meet peak demand in winter is 1,155MW. Any independent (private, state or municipality-owned) generator competing for this slot would face the competition of the depreciated coal-fired assets of Electra.¹⁰

The merit order curves below comparing the marginal variable cost¹¹ of electricity generators (see Chart 4) suggest that eventual competition in the generation market will be restricted to peak demand in winter (red lines account for winter baseload and peak demands). Since summer demand is fully covered by the hydropower and nuclear generation assets of Hidroenergetica and Electra, only a fraction of coal capacity is needed to meet winter peak demand. As Chart 5 shows, the competitors of the two national champions would have higher marginal costs since they would likely run coal- or gas-fired assets.

Given that the two firms would be controlled by one agency, it is likely that they would collude to limit supply and increase prices. This uncompetitive behaviour is known as capacity withholding, which involves either reporting lower than available generation capacity or reporting higher than real variable cost. A comparison of merit order curves with daily load curves indicates that this may be happening already in the current market structure and, by decreasing the coordination costs, there are reasons to expect that such behaviour would become both more frequent and more coordinated as the firms seek to maximise the rent over what would have been a competitive market price.

The market evidence suggests that Hidroelectrica withholds part of its available capacities at a time when its assets are in the merit in order to create a momentary shortage on the market, pushing prices up to a level which covers variable costs of coal-fired generators, thus allowing them to produce (see Charts 13 and 14 in Appendix). Coal-fired generation is not needed to cover baseload demand; yet the load curves display a significant proportion of coal-fired output. Hidroelectrica may then buy a share of coal-fired electricity output and re-sell it to energy traders in a fuel mix with its cheap hydro production.¹² Officials tolerate this uncompetitive behaviour in the electricity generation sector, referring to a perceived need to subsidise ailing coal- and gas-fired sectors through the redistribution of so-called hydropower and nuclear rent generated by Hidroelectrica and Nuclearelectrica.

⁹ Total remaining available capacity not included into the two national champion amounts to 4,166MW, as of December 2010.

¹⁰ 1,826MW needed to meet the peak demand of load power, 3rd Wednesday in December 2010.

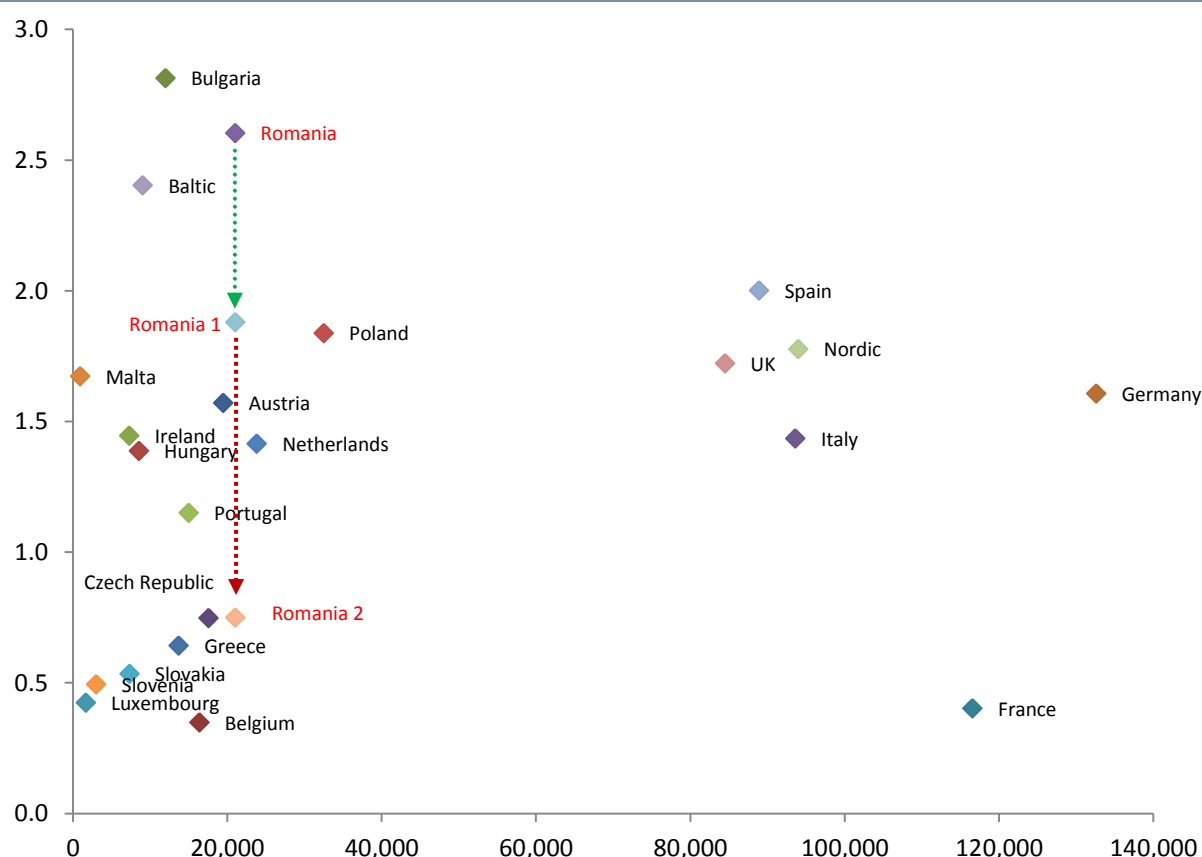
¹¹ The average marginal costs were calculated by using the income statements of electricity generators in 2008 and 2009. The marginal costs were calculated based on fuel cost, cost of electricity and water, maintenance and other material costs. The marginal cost of coal generators is the median of EC Turceni, EC Rovinari, EC Craiova, Termoelectrica and Electrocentrale Deva. The marginal cost of gas generators represents Elcen Bucuresti's marginal cost. Source: ISI Emerging Markets, income statements, 2008, 2009.

¹² The former general director of Hidroelectrica claimed in October 2010 that Hidroelectrica was requested by the economy ministry two years earlier to buy an annual amount of 1TWh from the coal-fired generator Paroseni, a unit owned by the bankrupt Termoelectrica. The price was regulated by the ministry at RON 179-230/MWh. The average OTC price was RON 146/MWh in 2008, whilst the average futures and day-ahead price were RON 177/MWh and RON 189/MWh, respectively.

At the moment, about 4,166MW of assets which would be left outside the duopoly (14,000MW in total) are in no position to compete with the two champions given that most of these assets are obsolete cogeneration or coal-fired power plants with high variable costs and/or seasonal production. The government acknowledges the high production costs of electricity generators left outside the duopoly, but it claims nevertheless that they should be considered serious market competitors of the proposed national champions.¹³

In conclusion, Hidroenergetica can meet full electricity demand in summer and off-peak demand in the winter.¹⁴ Electra's available capacity is close to the level required to meet full demand in summer; the firm is able to cover off-peak demand in summer as well. There is very little scope for competition from new entrants, even if some of Electra's plants are gradually phased out by 2020, as the government plans, in particular given Electra's control over coal mines (see the section on effects of vertical market concentration for more detail).

Chart 2: Installed capacity and market concentration (Residual Supply Index), 2007 data

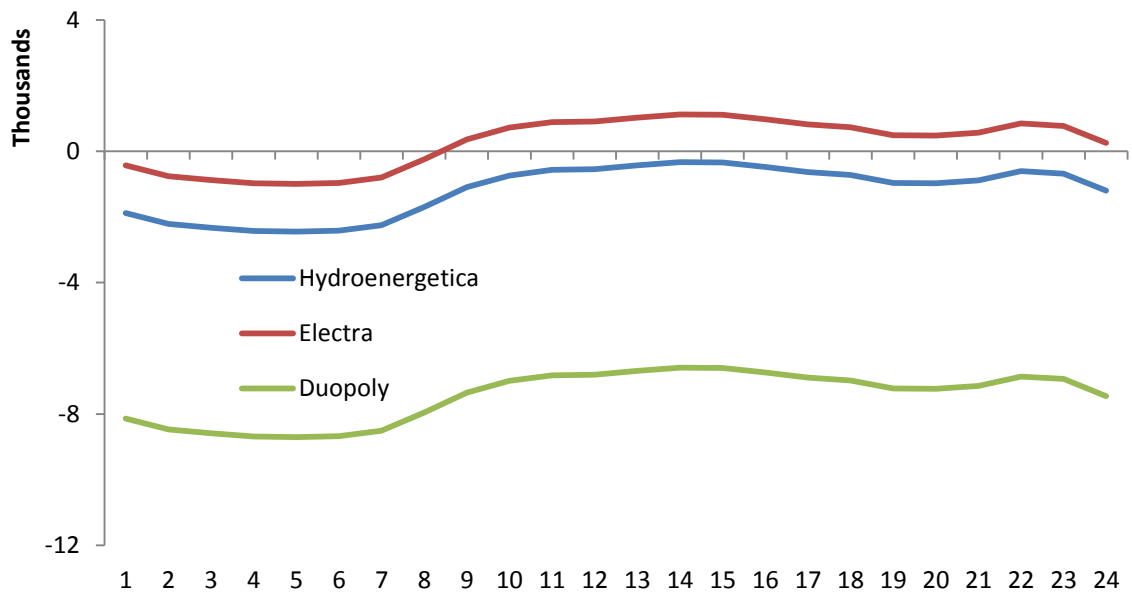


¹³ In its paper arguing in favour of reorganization of the energy sector, the government acknowledges the following actualized unit costs (AUC, €/MWh) of units independent of the two national champions: TPP Doicești (112), TPP Braila (99), Borzestî (144), TPP Galati (99). By comparison, the AUCs of the two national champions were set at 44 and 45.

¹⁴ Negative values in Chart 3 and 4 mean that the available capacity of the national champion is higher than the hourly demand.

Chart 3: Market power of the national champions

Remaining available capacities, Summer (Jul2010), 3rd Wednesday (MW)



Remaining available capacities, Winter (Dec2010), 3rd Wednesday (MW)

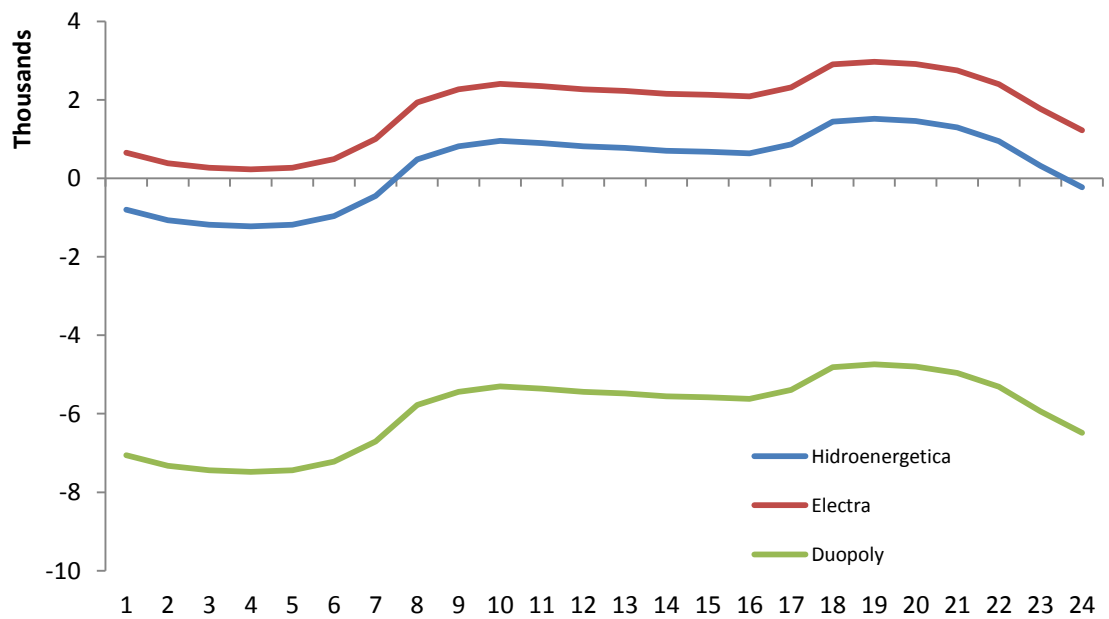


Chart 4: Merit order curve based on available capacity and summer and winter baseload and peak demands (MWh and €/MWh)

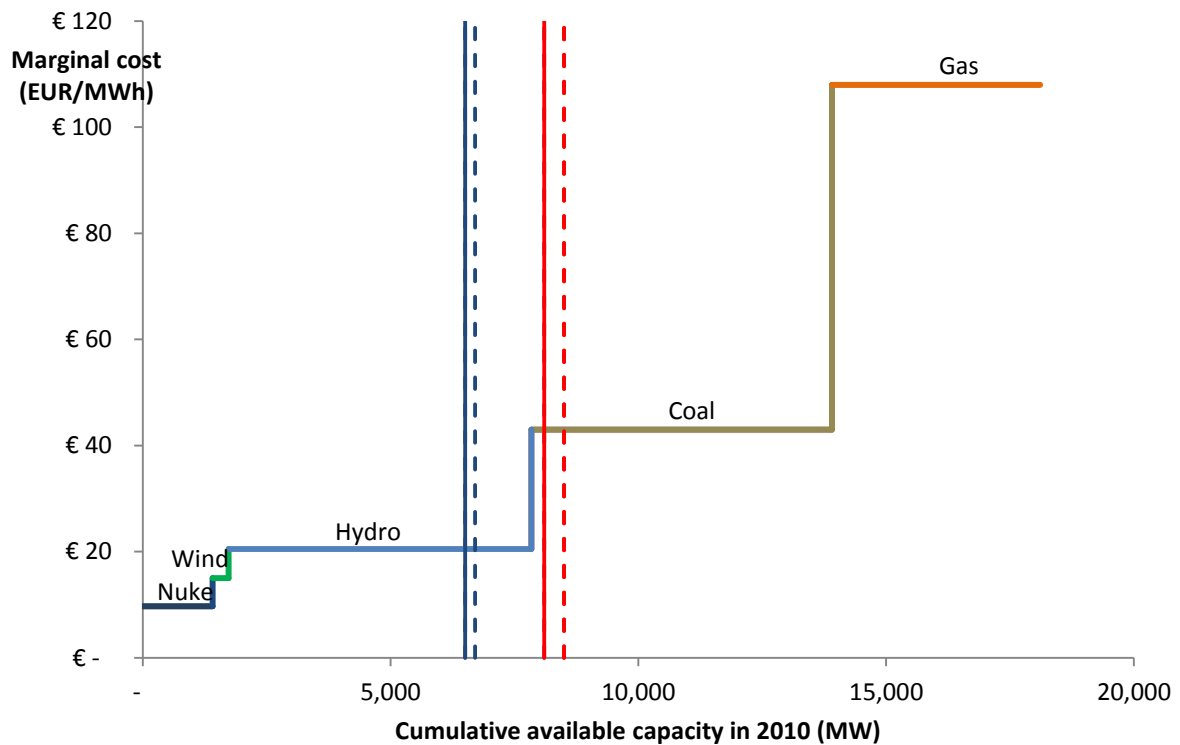
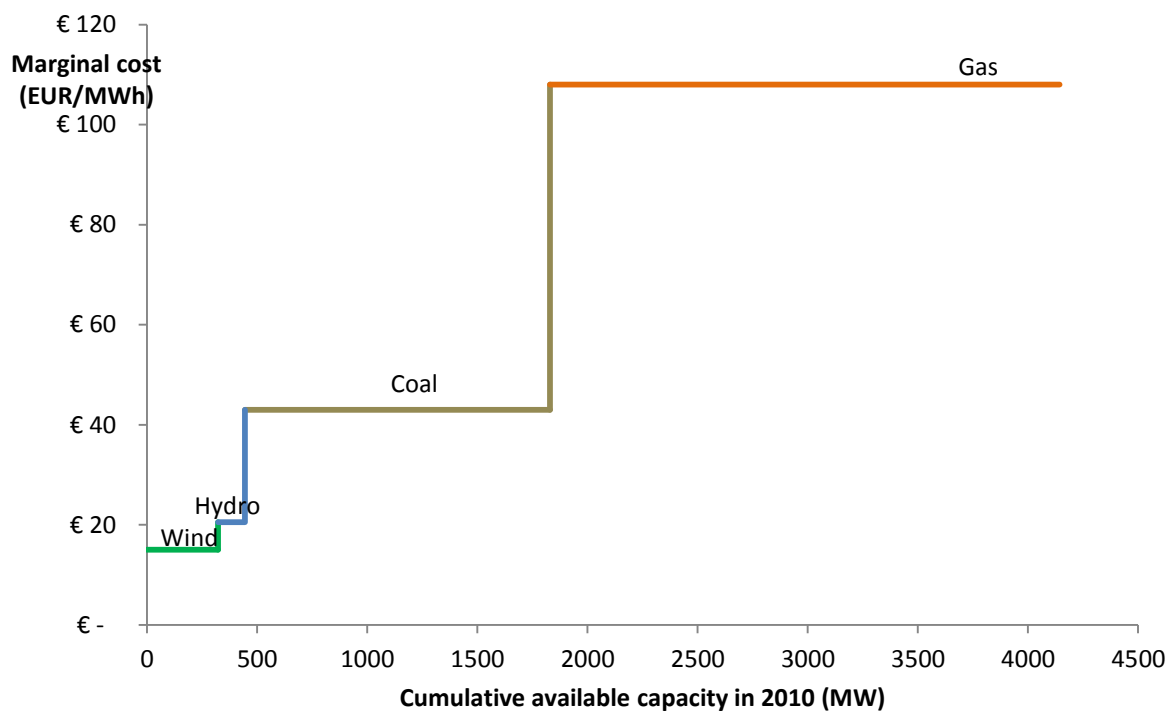


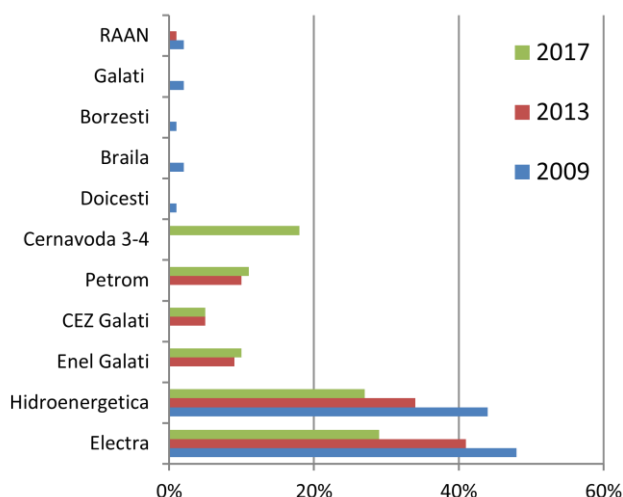
Chart 5: Merit order of independent available capacities (MWh and €/MWh)



Will private investment muscle-in?

The government argues that any harmful effects the duopoly might have on the market should be remedied in the mid-run as new private investment into efficient generation capacities with lower variable costs dilute the market power of the two incumbent firms. The government is assuming investments in two nuclear reactors in Cernavoda, in Petrom's (the largest oil producer in Romania) projected CCGT plant and a number of projects agreed in 2006-2008 between Termoelectrica and private investors such as Enel, E.ON and CEZ (see Chart 6). The government believes that new wind generation capacity, which should be installed in the coming years, would significantly reduce the market power of the two national champions as well.

Chart 6: Government forecast of market share of electricity generators



Source: Romanian government

These claims are exaggerated. Apart from Petrom's 860MW gas-fired power plant, which may be commissioned in 2011-2012, other projects remain on paper only. CEZ announced its withdrawal from the 400MW CCGT project with Termoelectrica in Galati. Furthermore, Enel and E.ON's projects with Termoelectrica are significantly delayed by red tape and disagreements between private and state-owned electricity generators on their equity contributions to the projects. The construction of reactors in Cernavoda nuclear plant is beset by a lack of financing and government indecision. The government wishes to retain majority control in the special purpose vehicle, but it lacks money to finance its participation.

In addition, new private generation assets will not challenge Electra's and Hidroenergetica's market power. These new assets will only diminish the market shares of small and medium generators, such as Termoelectrica's obsolete power plants still in operation (Mintia, Doicesti, Borzesti etc.), which are not part of the two vertically integrated firms. New private investment, if indeed such appears, will not decrease the market power of the national champions. It will merely replace those generators that will likely have to shut down anyway because they fail to meet EU environmental obligations.

The government also counts on new wind generators to dilute the market power of Electra and Hidroenergetica. It is difficult to imagine wind generation, which is inherently unpredictable, competing with the large hydropower, nuclear and coal-fired generation fleets of the two national champions. For a start, the relevant electricity markets will be different. Wind generators would be bidding on the spot or day-ahead markets. On the futures market, however, the two champions will have a strong competitive advantage because of their ability to provide stable baseload.

Regulation being prepared by the regulator ANRE will limit the investment appeal of large wind farms. It is probable that large wind electricity producers will not be allowed to sell their output on

the relatively large and liquid regulated market and will be liable for imbalance charges. And even though wind generators may reduce electricity prices on the spot or day-ahead market due to their lower marginal costs, their capacity to compete with the large hydropower, coal and nuclear generators will be hindered by the high costs on the ancillary electricity market (see below). Moreover, as wind generators will be located in a relatively small geographical area, congestion of the electricity grid is likely to weaken their ability to challenge the state-owned national champions.

Perhaps the most compelling argument against government policy here is that private investors will be reluctant to operate on a market where they would be captive to state-owned generators. The market power of the two champions will make them price setters with leverage over wholesale price formation. Furthermore, private investors will not be able to compete on price with the state-owned generators, most of whose assets are depreciated. Additionally, by manipulating outputs and prices, the national champions could force any significant competitor to exit the market.

Will increased demand and imports reduce concentration?

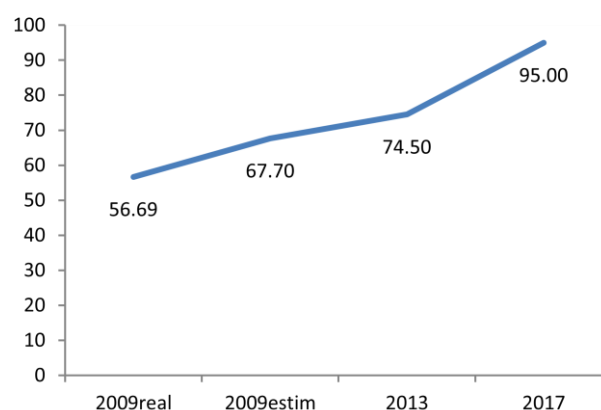
The government argues that increased demand for electricity will resolve automatically the problem of high market concentration, either through investment into new generation capacities or higher electricity imports.

We disagree. We see no evidence to support the kind of aggressive increases in demand necessary to dilute the market power of the two champions envisaged by the government. To achieve an RSI of 2, which indicates a fairly competitive market, total capacity would have to double, assuming that available installed capacities of the duopoly remain constant.¹⁵

We consider overstated government forecasts of total electricity output of some 100TWh by 2020 (see Chart 7). The economic downturn in 2009-2010 and an uncertain recovery in 2011 make such a growth in electricity consumption improbable.

Government forecasts are rarely reliable, whether in Romania or elsewhere. To base a policy that will have such an immediate and harmful impact on investment decisions, prices and the liquidity of electricity markets upon such uncertain, long term forecasts seems unwise. The Romanian state energy strategy in 2007 forecasted electricity production of 67.7TWh for 2009, almost 20% higher than the real output of 57TWh. Transelectrica's forecasts for electricity demand are rather sober when compared to those made by the government. Chart 8 below shows Termoelectricia's base and optimistic scenarios for electricity consumption over the next 10 years. Transelectrica forecasts 66.6 TWh in 2020 best case, some 33TWh less than government forecasts for 2020 and only 11 TWh more

Chart 7: Government forecast of electricity production (TWh)



Source: Romania's energy strategy, 2007 and ANRE monthly report, December 2009

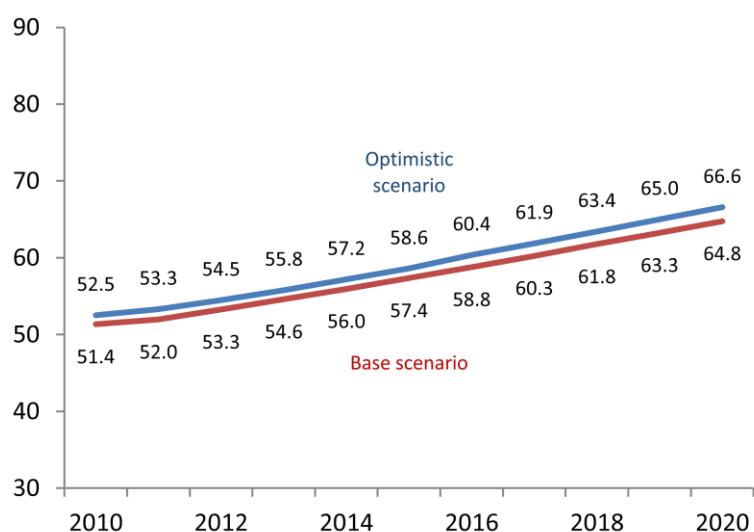
¹⁵ And demand would peak at 11,000MW as predicted by Transelectrica's most optimistic scenario.

than in 2008, the peak consumption year. According to Transelectrica, peak net demand is forecasted at 11,000MW. Adding a power reserve of 30%, the required installed capacity would amount to about 14,500MW. This equals the current available capacity of the two champions, or 4,000MW less than the total current available capacity of Romania. Assuming that total generation capacity from wind will increase in coming years and that an additional 1,400MW will be installed in the nuclear power plant Cernavoda (in which the government has a 60% majority stake today), it is highly unlikely that additional capacities will be required in the next decade.

The government argues that imports are another source of competition for the national champions. This argument is flawed. First, interconnector capacities with neighbouring countries and the way those capacities are auctioned, mean that we are a long way from an integrated regional market with enough liquidity to decrease Hidroenergetica's and Electra's market power. Moreover, Romania is a net electricity exporter, with imports accounting for less than 1.4% of electricity

consumption in 2009. Only 1.5TWh have been imported in 2008 and 2009 compared to 8.52TWh exported in the same period.¹⁶ Romania exports significant amounts to Serbia and Hungary (1,649GWh and 585GWh in 2009) and imports from Ukraine (1,791GWh). Lastly, Bulgaria, as the only country with the potential to become a significant exporter of electricity to Romania, would not have enough capacity unless it completes the Belene¹⁷ nuclear power plant.

Chart 8: Forecast of electricity consumption, 2010-2020 (TWh)



Source: Transelectrica

Vertical market concentration

Vertical market power may be defined as the power of a vertically integrated firm involved in more business areas to use its dominance in one area of its business (electricity generation) to increase overall profits. We believe that the formation of the two national champions will lead to two types of market abuse: vertical foreclosure and margin squeeze.

¹⁶ ANRE monthly monitor of electricity market, December 2009, pg. 7.

¹⁷ For a summary of the economic arguments against NPP Belene, read our report [here](#).

Vertical foreclosure

Vertical foreclosure is uncompetitive behaviour whereby a dominant firm uses its dominant position in one market segment (usually a segment with high entry barriers) to prevent entry of new market participants into another segment (with lower entry barriers). We believe that Electra's and Hidroenergetica's monopoly over lignite and hard coal supplies might significantly impede potential competition in the electricity generation sector.

Electra and Hidroenergetica will control lignite (produced by SNL Oltenia) and hard coal (CNH Petrosani) reserves, respectively. Furthermore, the government controls the largest share of domestic gas reserves through the state-owned Romgaz.¹⁸ The control of the government and of the two national champions over these conventional fuel reserves will discourage new market entrants.

Electra will be able to block the entry of privately-owned coal-fired generators through capacity withholding in two ways (or a combination of the two). First, it can withhold physical coal mining capacities by reporting lower than real minable reserves. The two companies' assets will not be affected since they are likely to benefit from long-term supply contracts. Electra's and Hidroenergetica's future management have already announced that a part of the current lignite and hard coal mines will be shut down. The shortage of coal from domestic sources would force private coal generators to look for coal imports. But importing coal from European markets is expensive and would make private generators uncompetitive. The futures coal prices with delivery in 2011-2016 vary around \$ 116-126/ton¹⁹, significantly higher than the domestic lignite and hard coal prices (see Table 1).

Another way of achieving a similar effect would be if Electra were to report higher than real marginal costs of mining. This would raise marginal costs of a potential new market entrant in the electricity generation sector to such levels that the new entrant could not compete with Electra's legacy coal- or lignite-fired assets.

Table 1: Price of lignite and coal from domestic mining ²⁰		
	SNL Oltenia	CNH Petrosani
Production (tons)	14,400,400	1,975,300
Revenues from sold production (RON)	880,055,515	408,389,328
Price/ton (USD/ton)	20.04	67.79

Margin squeeze

A second impediment to effective competition stemming from vertical market concentration is the behaviour called margin squeeze. Margin squeeze describes the situation when a company uses its

¹⁸ Romgaz had a market share of 51-53% of domestic gas production.

¹⁹ Monthly coal futures on ICE Rotterdam.

²⁰ All data is for 2009. Data on production have been reported to us by the two companies. Revenues from production sold have been taken from companies' income statements, as reported by ISI Emerging Markets. RON/\$ exchange rate was 3.05.

dominant position in one market segment with relatively high entry barriers, such as generation, to maximize its overall profit by being able to influence margins in another market segment along the supply chain with lower entry barriers, such as sales and trading.

We believe that the two champions may be able to use their dominant positions in areas with significant entry barriers, such as mining and generation, to hinder competition in the trading sector. The trading sector would become uncompetitive despite the fact that there may appear to be no problems with horizontal market concentration. For example, there may be a number of traders each possessing relatively small market share. However, the terms of the market would be dictated by the duopoly.

The wholesale electricity trading sector has been developing reasonably well, despite the fact that the futures market is still relatively illiquid.²¹ There were 76 electricity traders operating on wholesale and retail markets in September 2010.²²

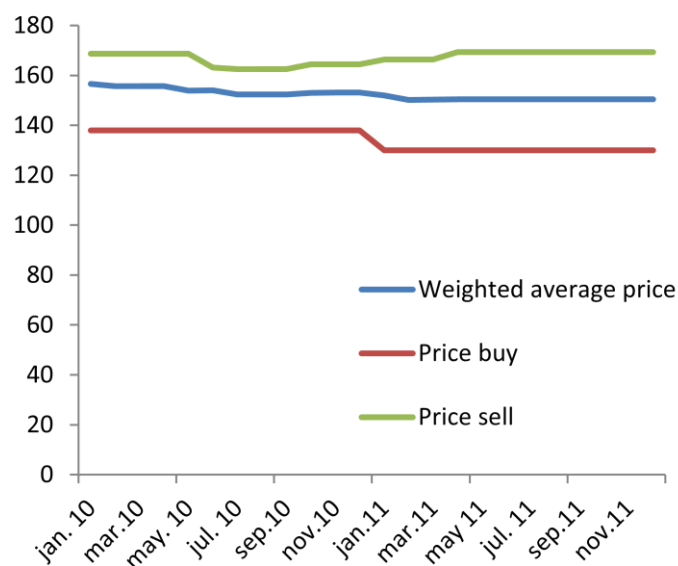
Day-ahead market trading has been particularly competitive, with an HHI for selling and buying of 978 (C1=19%) and 709 (C1=18%), respectively.

An important impetus to the development of a well-functioning wholesale market was the decision of state-owned generators to cease making long-term contracts with favoured traders. These contracts avoided market instruments like power exchange platforms, and gave such favoured traders a greater market share than they would have enjoyed under fair competition.

If the government wanted to boost competition, it should have focused on eliminating burdensome red tape, which hinders further development of a liquid futures market, rather than on the creation of two vertically integrated firms.

The most significant risk for the trading sector is that the duopoly would eventually establish its own trading entities. In this case, the two firms would become market-makers. They would buy and sell the largest quantities of electricity on the market and dictate terms to remaining traders. By virtue of being vertically integrated, the two firms would behave in a way which would maximise their overall profit, not a profit of their trading activities. Therefore, in an extreme case, they could charge zero

Chart 9: Futures price, 2010-2011 monthly delivery (RON/MWh)



²¹ Futures market has become extremely illiquid in the last years, partly because trading procedures have been overregulated by ANRE and the market operator Opcom.

²² 31 traders traded exclusively on the wholesale market and 45 on wholesale and retail markets. Source: ANRE monthly monitor, September 2010.

margins on their trading and sales, forcing those traders without their own generation sources out of the market.

Even if the two firms do not establish their own trading entities, electricity traders will see their profits squeezed because they will have to buy electricity from a duopolistic generation sector, which would be able to manipulate prices (see section on horizontal concentration), in particular on a relatively illiquid futures market. Electricity imports are low because of low interconnector capacities with neighbouring countries and independent generation units will be scarce. Since the two vertically integrated firms would be the price setter, they will attempt to maximise their profit at the level of generation at the expense of traders, which operate on a relatively competitive market.

The two firms may engage in a wider spectrum of uncompetitive behaviour as well, which does not necessarily need to increase prices or the profits of the two firms. This behaviour is rent-seeking. Romanian energy firms have a track record in maximising rents, rather than profits, and there is no reason to assume that such behaviour will change with the creation of the two champions.

One recent documented example of such behaviour is Hidroelectrica's sale to ArcelorMittal in December 2010. ArcelorMittal placed a buy offer on the futures market (PCCB) for 1.75TWh output at a price of RON 130/MWh. Hidroelectrica accepted both the offer and the price, although it was about RON 20/MWh less than weighted average futures price for 2010 (see Chart 9). By placing its sell offer, Hidroelectrica could have earned at least RON 30/MWh more as the simple average futures price for sell option contracts for January 2010 to December 2011 is RON 167.1/MWh.

PRICES

Here we examine the impact of high market concentration on electricity prices. We argue that increased concentration will increase prices.

Balancing and ancillary services markets

The market power of the two national champions will be most significant on the balancing and ancillary services markets (see Table 3). In particular, the secondary and the fast tertiary reserves will be harmed. The secondary reserve, connected when higher load power is necessary, is covered currently by Hidroelectrica. As Hidroenergetica retains most of Hidroelectrica's assets, it would become a virtual monopolist in the secondary reserve sector of the balancing market.

Electra would have a dominant position on the balancing market as well. The fast and slow tertiary reserves are usually provided by the coal-fired generators (Turceni, Rovinari, Craiova and Termoelectrica) as back-up in case the secondary reserve comes online. The only significant competition for tertiary reserves in the mid-run would come from Hidroenergetica (using Elcen's gas-fired assets).

There are two implications for the functioning of the balancing market. The first is that prices on the balancing market are likely to increase as the market becomes duopolistic.

Second, the windfall profits of the two champions will be made at the expenses of private investors in renewable electricity generation. Wind generators are likely to be the main losers as they are most exposed to liability for imbalance charges. The current regulation sets out that RES generators, which are qualified as non-controllable RES production units, are not liable for imbalance charges unless they trade electricity on the day-ahead market or on OTC contracts.²³ However, draft regulation prepared by ANRE to implement the new RES law sets out that wind generators above 10MW would be qualified as controllable RES producers and thus would be liable for imbalance charges.

Table 2: Electricity prices ²⁴			
Market	Average price (RON/MWh)		
	2007	2008	2009
Regulated	157.17	158.15	164.44
Bilateral	125.82	146.07	158.68
Futures	166.99	177.04	192.54
Day ahead	161.70	188.53	144.77
Ancillary (weighted)	146.21	197.69	141.17

²³ See ANRE's order no. 39/2006, art. 17 and 29.

²⁴ Table 2 shows the average electricity prices on different types of contracts, 2007-2009.

Table 3: Average market concentration in ancillary services (Jan-Aug 2010)		
Sector	C3 ratio	HHI
Decrease load		
Secondary reserve	94.78%	5,081
Fast tertiary reserve	85.36%	3,424
Slow tertiary reserve	75.18%	2,484
Increase load		
Secondary reserve	95.20%	5,123
Fast tertiary reserve	80.98%	3,415
Slow tertiary reserve	79.38%	2,881

Wholesale electricity prices

The government claims that the creation of the two vertically integrated firms will not affect wholesale prices. We disagree. The duopoly is prone to collude, in particular to supply below-equilibrium output, thus driving up prices.

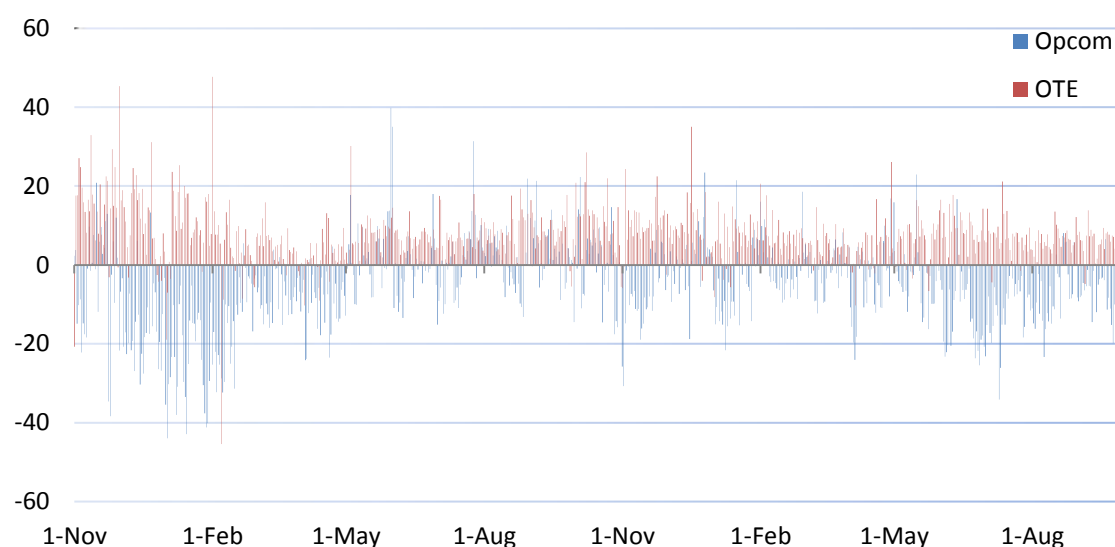
The Romanian electricity market has enjoyed some of the lowest wholesale electricity prices in the region. The combination of fuel mix with a significant share of low variable cost production (hydro and nuclear generation cover approximately 50% of the total load), depreciated assets, weak interconnection capacities with Hungary, and the relatively competitive generation sector together has meant relatively low wholesale electricity prices compared to other regional markets. Chart 10 below shows the spreads of Opcom and Czech OTE day-ahead market prices over the German EEX spot prices between November 2008 and September 2010. Given that Romania's futures market is still illiquid, we chose to compare spreads of day-ahead prices. In comparison, most output in Germany and the Czech Republic is traded as futures.

We observe that the Opcom day-ahead prices are persistently lower than the benchmarking EEX values. Czech prices on the other hand are often above German EEX spot prices, although the Czech Republic has a higher share of nuclear and hydropower capacities in total capacities than Germany. This is mostly attributable to the effects of CEZ's dominant market position²⁵ and rigid auctions of cross-border interconnection capacity with Germany.²⁶

²⁵ For a detailed discussion of the Czech market, please refer to our earlier study *CEZ Unplugged* available [here](#)

²⁶ Export Net Transfer Capacity (NTC) is 2,100MW to Germany. Source: European Network of Transmission System Operators for Electricity (ENTSOE).

Chart 10: Spread of Opcom and OTE over the German prices EEX, Oct. 2008 to Sept. 2010 (€/MWh)



If today's market structure were to remain, Romania would enjoy lower electricity prices than the regional average despite increased investment in modernisation of generation assets needed to comply with EU environmental regulations.

Earlier, we argued that highly concentrated markets consistently produce prices that are higher than prices under competition. High market concentration leads to a transfer of wealth from consumers to producers and creates a welfare loss for the whole society. Those arguments have been backed up by plenty of empirical evidence from several countries. Below we present some tentative evidence.²⁷ The study by London Economics assessed the effect of market concentration on price-cost mark-ups of generation companies in six countries. The study proved that market concentration in the generation sector is positively correlated with the increase in price-cost mark-ups.

To assess the effect the creation of the duopoly would have on Romanian electricity prices, we borrowed the regression coefficients of RSI on price-cost mark-ups calculated for Germany. Germany was chosen due to its comparable fuel mix and lower market concentration. Additionally, we chose a conservative scenario by picking the lowest regression coefficient ($\beta = -0.7$). As the RSI for Romania would decrease from 1.43²⁸ to 0.49, we calculated that the creation of the duopoly would increase the price-cost mark-up from 24% (in 2008) to a value between 86% to 126%.²⁹, depending on development of electricity prices. We calculated the price-cost mark-up (PCMU) in several steps. First, we calculated blended average marginal costs of the duopoly as the weighted average of individual generators' variable costs using their 2008 output as weights. We preferred year 2008 as the reference year because electricity demand was not squeezed by the economic crisis. Then we

²⁷ We were unable to develop a causal model which would forecast mark-up increases after the market is restructured as the required data is unavailable or of poor quality.

²⁸ The RSI of 1.43 was calculated based on current available capacities.

²⁹ Calculation is based on an average peak load demand of 8,467MW (average demand for peak load, in the 3rd Wednesday of December).

calculated the real and potential PCMUs based on 2008's average weighted futures price (€52.05/MWh).

Theoretical assumptions predict that the most concentrated market would produce the highest prices and highest mark-ups over what would have been a competitive price. Indeed we find that the French PowerNext (dominated by EDF and GDF) and Scandinavian Nord Pool (low market concentration) represent cap and floor power exchange prices levels in Europe. EEX and OTE form the middle of this distribution, given their market structure and the integration of their markets. Chart 11 below shows the moving averages of futures prices for 2009 on five power exchange markets: EEX (Germany), OTE (Czech Republic), PolPX (Poland), PowerNext (France) and Nord Pool (Scandinavia).

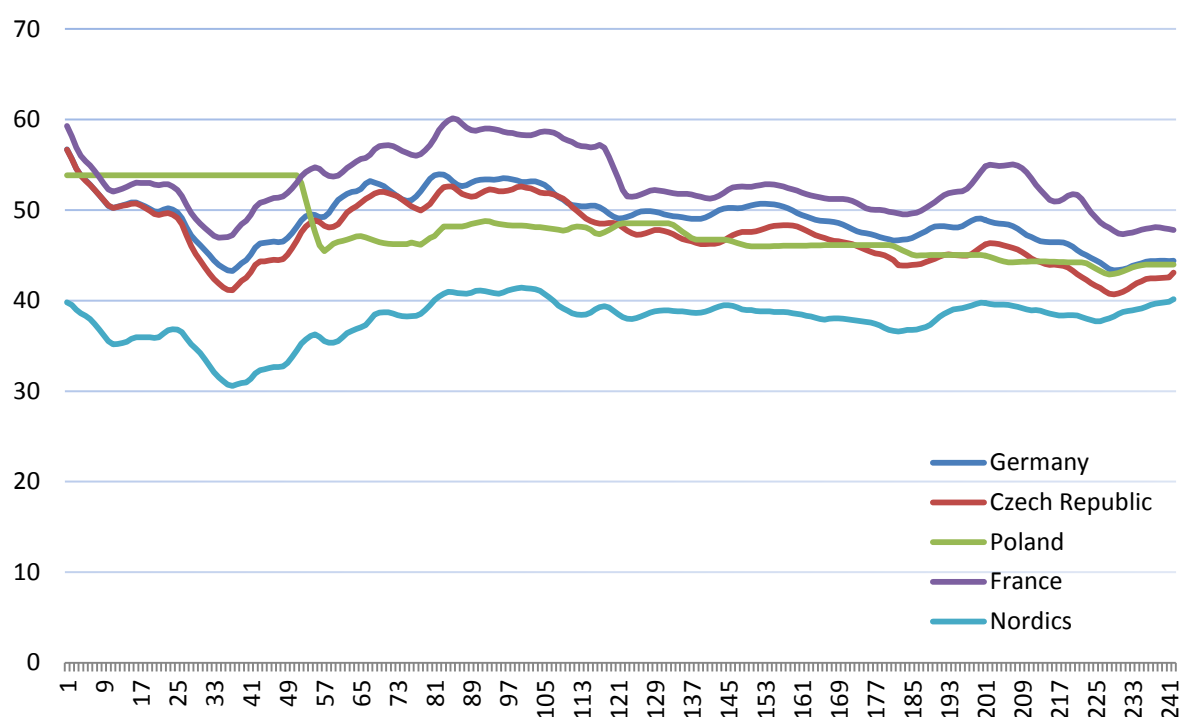
To control for the impact of fuel mix on prices, we accounted for the fuel mix of ten various European countries and calculated the share of nuclear and hydro (low marginal costs) in total electricity production (see Table 4). Our tentative conclusion is that high market concentration produces high prices independently of the fuel mix. For example France, which generates 88% from nuclear and hydro has the highest wholesale electricity prices from our sample. The Czech Republic has a larger share of hydro and nuclear power in total generation than Germany and yet Czech futures prices are very similar to those of Germany. Poland, on the other hand, has a small amount of nuclear and hydropower generation capacities, but lower average prices than both Germany and the Czech Republic. And Nordic countries, with the lowest market concentration, have the lowest price.

Country	Coal	Gas	Nuclear	Hydro	Wind	Total	Share	RSI	Price (€/MWh)
Czech Rep	5,794	2,919	26,551	2,376	245	83,518	35%	0.75	46.52
Denmark	17,458	6,928	0	26	6,928	36,391	0%	NA	NA
Germany	124,617	75,921	148,495	26,963	40,574	637,214	28%	1.61	49.16
France	24,447	2,1915	439,468	68,838	5,689	576,034	88%	0.40	53.04
Austria	5,524	11,204	0	40,678	2,014	67,101	61%	1.57	NA
Poland	83,914	3,166	0	2,747	837	156,177	0.2%	1.84	47.92
Romania	113	9,924	11,226	17,195	4	64,955	44%	2.40	43.83
Finland	8,512	11,247	22,958	17,112	261	77,436	52%	NA	NA
Sweden	514	603	63,889	69,211	1,996	150,036	89%	NA	NA
Norway	65	432	0	140,522	917	142,669	98%	NA	NA
Nordics combined	26,549	19,210	86,847	226,871	10,102	406,532	77%	1.78	37.88

Source: Candole Research, Eurostat

Legend: Price = Average of 5-day rolling averages 2009, Romania is simple annual average 2009

Chart 11: Futures moving averages, 2009, €/MWh



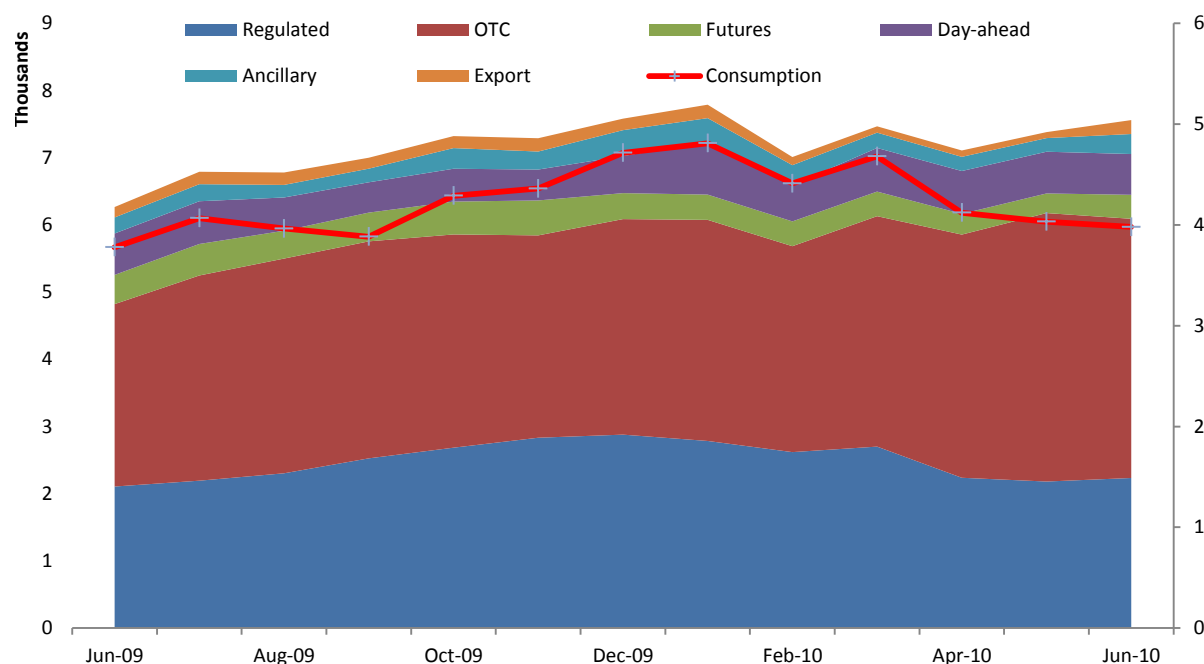
The price increase is likely to be exacerbated by the trading options of the state-owned generators. DG Competition's inquiry in the energy sector argues that long term contracts increase the market power of incumbent firms, decrease liquidity of the wholesale market and increase wholesale electricity prices. We may expect similar results in Romania, where most electricity is traded on regulated and OTC contracts. Chart 12 below demonstrates that only a marginal output is traded on Opcom platforms, with most of the shares being captured by the regulated market and over-the-counter contracts. About 76-80% of the electricity output produced in the period of June 2009 to June 2010 was traded on regulated and OTC contracts. Furthermore, the volumes traded on futures and day-ahead contracts have negative compound monthly growth rate in the period June 2009 to June 2010 (see Table 5 above).

Table 5: Compound growth rate for types of electricity contracts

Contracts	CGR (13 months)
Total	1.46%
Regulated	0.45%
OTC	2.74%
Futures	-1.51%
Day-ahead	-0.11%
Ancillary	1.71%
Export	2.25%
Consumption	0.40%

It is not unreasonable to expect that the same trading pattern will be maintained under a duopoly market structure. Hidroelectrica, for instance, announced last year that it would extend its ongoing OTC contracts, supposed to end by 2012, until 2017. Although the government insists that Opcom platforms will be given priority by trading higher outputs of the two national champions, it has failed to implement such a policy thus far.

Chart 12: Electricity trading (GWh)



HURTING ELECTRICITY TO HELP COAL

We have shown that the formation of two vertically integrated firms will have the opposite effects on the electricity market to those envisaged by the government. We shall now look briefly at the real reasons for this misguided policy.

The policy is an attempt to save the coal-fired sector by gambling with the electricity sector. Successive governments have failed to force state-owned coal-fired electricity generators to invest in environmental compliance required by the European Commission. Instead, the government decided to sell the three main generators (Turceni, Rovinari and Craiova). The energy strategy for 2007-2020 called for their sale and the state's shares in the three generators were duly transferred to the privatisation agency. At that point, the privatisation process ground to a halt.

Time is running out. Compliance deadlines are fast approaching (see Table 6) and Romania cannot expect further extensions from the European Commission in this area. Hence the national champions policy: The government hopes that coal-fired generators and Elcen Bucharest will profit from the better credit market ratings of Hidroelectrica and Nuclearelectrica, despite clear signals to the contrary from the World Bank, and thus be well placed to secure funding for urgent investment into environment compliance measures.

Table 6: Compliance deadlines for coal- and gas-fired generators			
Generator	Emissions	Capacity subject to compliance	Deadline
Electrocentrale Deva	SO ₂	4 boilers, 264 MWt each	31 December 2008
Turceni		4 boilers, 789 MWt each	31 December 2010
EC Craiova (II, 1)		2 boilers, 396.5 MWt each	
TPP Paroseni		1 heat boiler Benson, 467MWt, and 1 hot water boiler, 120MWt	
EC Craiova (II, 2)		2 hot water boilers, 116MWh, and 2 heat recovery boilers, 68MWt	31 December 2011
EC Rovinari		2 steam boilers of 879MWt	
Electrocentrale Deva		4 boilers, 264MWt	
Elcen Bucharest West		2 steam boilers, 458MWt	31 December 2012
EC Craiova, Isalnita		4 boilers, 473MWt	
Elcen Bucharest, South		4 steam boilers, 287MWt each 2 steam boilers, 458MWt	31 December 2013
Elcen Bucharest, Progresul		4 steam boilers, 287MWt each	
EC Rovinari		2 steam boilers, 878MWt each	
Electrocentrale Deva		4 steam boilers, 264MWt each	
Electrocentrale Deva	NO _x	2 steam boilers, 127MWt + 269MWt	31 December 2010
TPP Paroseni		1 steam boiler, 467MWt, 1 hot water boiler, 120MWt	
Elcen Bucharest, South		4 hot water boilers, 116MWt	31 December 2011
EC Craiova, Isalnita		4 boilers, 473MWt	
Electrocentrale Deva		4 boilers, 267MWt	
Elcen Bucharest, Palas		1 hot water boiler, 116MWt	31 December 2012
Elcen Bucharest, Mures		4 steam boilers, 277MWt	
Elcen Bucharest, South		1 hot water boiler, 116MWt	31 December 2013
Elcen Bucharest, Palas		1 hot water boiler, 116MWt	
Electrocentrale Deva		4 boilers, 264MWt	
Elcen Bucharest, Mures		2 boilers, 277MWt	

Source: EU accession treaty

The second reason for the policy is to save what can be saved of the coal mining sector, and to shift the blame for what cannot be saved onto the management of the two firms. For years, the state has struggled and failed to restructure the sector. Successive governments have talked up the

importance of the coal mining industry to Romania's energy security as a way to justify bailing out the Jiu Valley in an effort to secure the region's political support.

The coal mining sector is bankrupt (see Table 7 below), despite the subsidies poured into it over the last twenty years. CNH Petrosani, the biggest employer in one of the poorest regions of the country, is the state's largest debtor and as of 2011, can no longer be subsidized through state aid schemes.

The government has tried indirectly and opaquely to subsidize the sector using cheap electricity output from Hidroelectrica and Nuclearelectrica. As we demonstrate earlier, Hidroelectrica was forced to buy expensive coal-fired output from TPP Petrosani and to sell it together with its cheaper hydropower output. In 2010, the economy ministry signed export contracts of about 500MW load power with Serbia and awarded the contract to the state-owned distribution company Electrica. Electrica exported outputs from the coal-fired generators and Hidroelectrica and Nuclearelectrica, a transaction market participants insist is a hidden subsidy of coal-fired producers, Turcenii and Rovinari.

The government hopes that by bundling the mining companies up with the coal-fired generators, it might solve two problems together: The mining sector would be subsidized by electricity contracts, taking advantage of the low marginal cost of the nuclear energy produced by Nuclearelectrica. And the politicians may shift the blame for the inevitable divestment of loss-making mining units onto the management of the two national champions.

Table 7: Indebtness of coal mining firms, 2008 (brackets) and 2009			
Company	Net loss	Operating profit margin	Debt to equity
SNL Oltenia (lignite)	-70,424,251 (-29,885,980)	-7.22% (-2.19%)	52.4% (39.61%)
CNH Petrosani (hard coal)	-606,433,554 (-351,162,688)	-87.41% (-43.88%)	-118.16% (-122.5%)

Source: ISI

CONCLUSIONS AND RECOMMENDATIONS

In Double Trouble, we have considered the effects of the creation of two vertically integrated companies on competition on the Romanian electricity market, private investment and prices. We demonstrate that, contrary to government claims, the policy would significantly impede competition, crowd out private investment and raise prices.

We find that, from being one of the more competitive markets in Europe, Romania would become one of the least competitive. Since both firms would be controlled by a single government agency, there are strong grounds for concerns that the market might become quasi-monopolistic, with no real competition between the two generators, and a high probability of collusion.

Private investment will be crowded out as a result of the duopoly's control over the generation and mining sectors. Hidroenergetica and Electra would have sufficient available capacities to meet the electricity (baseload and peakload) demand in the short and medium term. This would leave little space for outside competition, in particular considering the low variable costs of Hidroelectrica's and Nuclearelectrica's legacy assets. The duopoly would be motivated to prevent the entry of new market participants by a behaviour known as vertical foreclosure, in particular through its control of coal mines.

Recent studies have established a causal link between market concentration, the margins of generators and wholesale electricity prices. The findings of these studies may be expected to apply to Romania as well. We conclude that, as a result of the policy, the duopoly's mark-ups over what would have been a competitive price would increase from 24 to 127% on 2008 prices. Consumers would bear these costs despite the fact that Romania has a regulated market: The duopoly would be reporting higher than competitive marginal costs, which enter the regulatory formula as justifiable costs, and this would lead to higher consumer prices.

For all these reasons, we believe that the government's stated justifications for the policy are false. We believe that the real purpose of the policy is to save the coal-fired and mining sectors. Successive Romanian governments have failed to address the problem of inefficient coal-fired generators, which are not competitive due to their high marginal costs of production and which do not meet environmental standards. Past governments failed to privatise those assets when there was demand and now the government faces a risk of being forced to shut down those plants because generators do not have the funds to invest in environmental compliance. The government hopes that it can maintain employment in the coal-fired and mining sectors through hidden cross-subsidies from hydro and nuclear generation, which are profitable due to their low marginal costs. Costs of that policy will be borne by consumers through higher electricity prices.

We believe that this is a wrong approach. Instead of pressing ahead with this bad policy, with all its demonstrable harmful effects, we recommend that the government adopts the following measures:

1. Protect and promote the emerging competitiveness of the electricity market. Work on creating liquid futures and spot markets by eliminating red tape, and creating and enforcing straightforward and transparent trading rules. Once that is achieved, abolish the regulated market. Competitive markets tend to have lower prices than uncompetitive.

2. Maintain Hidroelectrica and Nuclearelectrica as independent electricity generators and privatise them, preferably through listing majority stakes. This would generate much needed cash for the state budget and equity for the two firms, which they need to invest into growth (for example the pump-storage hydropower plant in Tarnita- Lapustesti) and maintenance of existing assets. Minority issue creates a risk that the management, backed by the state as the majority shareholder, would take decisions that do not maximise shareholder value, but rents, such as in the case of CEZ in the Czech Republic.
3. If the government is concerned about Hidroelectrica and Nuclearelectrica's ability consistently to earn an economic rent (profit over a normal profit in a competitive industry), it should consider taxing that rent and possibly redistributing that rent through some welfare programs to those who lose their jobs as a result of restructuring the coal mining and coal-fired generation sectors.
4. Privatised those coal- and gas-fired generators for which there is demand, and leave the rest to fail. Privatisation would bring cash to the central budget and equity into the financially strapped coal- and gas-fired firms. Allowing troubled firms to fail would not harm the sector. At the moment, Romania has an overcapacity of generation assets, and if the demand increases as the government suggests it shall, private investment will pour in to satisfy that demand.

In conclusion, we believe that competitive and transparent electricity markets, combined with profitable market participants, bring more benefits to Romanian consumers and the state than a policy of creating two vertically integrated firms designed to bail-out the ailing mining and coal-fired generation sectors. Consumers would benefit from relatively lower electricity prices and innovation, both of which are caused by competitive markets. Transparent and competitive markets attract investment, which creates jobs. And profitable firms can be taxed and proceeds redistributed to help those left behind by the restructuring of the sector.

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APPENDIX

Chart 13: Load curve, 3rdWednesday, December 2010 (MW)

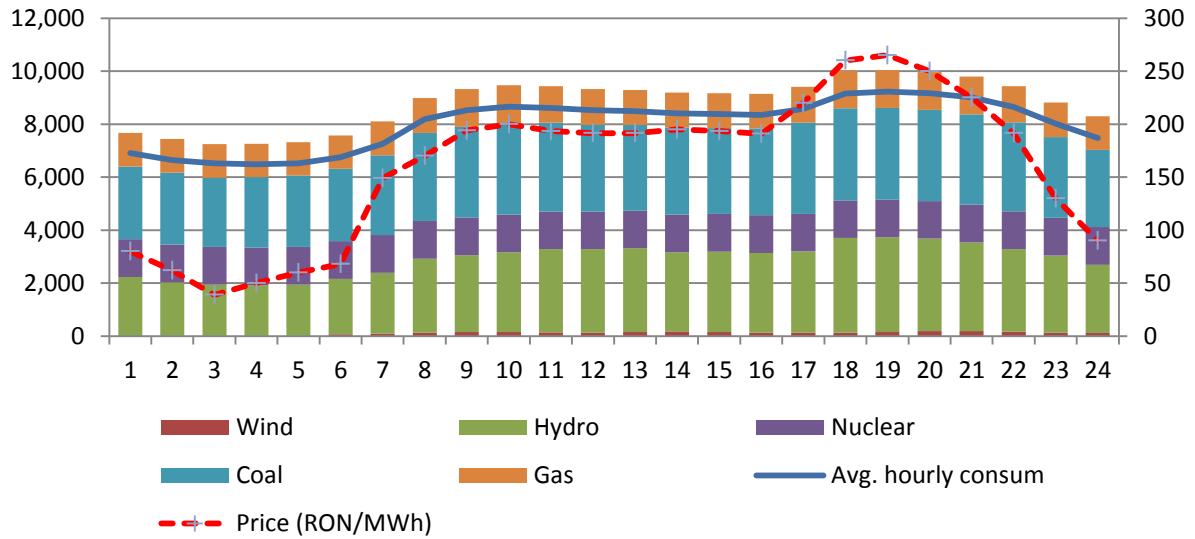


Chart 14: Load curve, 3rd Wednesday, July 2010 (MW)

