REKK
FOUNDATION FOR REGIONAL POLICY CO-OPERATION IN ENERGY AND INFRASTRUCTURE

WWW.REKK.ORG

REKK DISCUSSION PAPER

04
2017

ALFA DIALLO, PÉTER KADERJÁK, LAJOS KEREKES,
ANDRÁS MEZŐSI, ZSUZSANNA PATÓ AND LÁSZLÓ SZABÓ

ELECTRICITY MARKET INTEGRATION 2.0 IN CENTRAL AND SOUTH-EAST EUROPE

BACKGROUND

The objective of this discussion paper is to briefly assess the most relevant legislative proposals pertaining to the European electricity market that emerged from the 'Clean Energy for all Europeans' package published at the end of 2016. Identifying the most significant potential benefits and risks related to the key proposals can contribute to define a coordinated CSEE regional policy agenda in the upcoming legislative phase of the package.
In this discussion paper we focus on three areas from the electricity market design proposal:

- intraday and balancing market integration and cross-border reserve sharing;
- the role of capacity remuneration mechanisms in ensuring electricity supply security; and
- the pros and cons of phasing out regulated retail prices for household customers.

Implemented together, we think the above can contribute to a new more robust market design elevating the current electricity market to the next level ('Electricity Market Integration 2.0').

POTENTIAL BENEFITS OF REGIONAL INTEGRATION: MARKETS AND INSTITUTIONS

The Winter Package puts forth several proposals for better integration of electricity markets at the wholesale level and with respect to balancing. It simultaneously looks to upgrade operational rules and reshuffles some of the roles and mandates of the institutions involved in market and system operation. The test of these changes is whether they enhance the efficiency of these markets and whether the proposed institutional changes facilitate them. This test should be considered in the context of the already adopted rules and regulations on similar issues embodied in the grid codes.

Wholesale market integration

The market design proposal supports the current policy trend towards more integrated electricity markets and to this end proposes two important rules meant to respond to the persistent challenge presented by loop-flows. Loop-flows are unscheduled flows that enter the transmission system by the laws of physics, which in turn can obstruct available capacities used for scheduled commercial transactions. The divergence between the two flows result in lower NTCs and welfare loss due to the limitation on trading. There are several ways TSOs can relieve the pressure on the network caused by unscheduled flows (Table 1).
The current proposal is that interconnection capacities available for electricity trade defined by TSOs cannot be reduced due to accommodation of actual physical flows (in this case, loop-flows) in the network (ex-ante NTC limitation). In addition, it allows for the review of bidding zones by the European Commission. So far reviews are initiated on a case by case basis by the affected TSOs with ACER forming an opinion on compliance within the provisions of Regulation 714/2009.
For the Polish-German border this means offering NTC in the DE-PL direction, which for the moment is near zero. This new trading option would increase German electricity export that, consequently, would trigger remedial actions from the affected TSOs. Redispatch, however, comes at a cost which must be considered against the welfare increase created by the higher level of trade. Under the proposal, it is not the Polish TSO but the European Commission that must initiate the split of the DE-AT price zone based on a compliance assessment the manner and frequency of which is yet to be defined.
A potential separation of single national bidding zones, e.g. DE-AT market split, or splitting Germany into separate price zones would make the now hidden internal congestion within the single zone explicit. This decision is likely to have a very dramatic impact on wholesale electricity prices, estimated to result in 6-7 EUR/MWh price increase in Austria with additional spill over into adjacent CSEE markets.
Cross-border congestion management principles have been in place since the CACM Guideline was adopted in 2015. The Guideline foresees the establishment of a common grid model based on compulsory data provision underpinning daily and regional calculations. These provisions aim at increasing the transparency and consistency of the defined NTC values available for trade and their allocation. At the institutional level, these roles are vested to the Regional Security Coordinators (RSCs) in the System Operation Guidelines created by the TSOs to assist the implementation of the CACM Guidelines. According to the current proposal, the calculation currently performed by the RSCs will be taken over by the to-be established Regional Operating Centers (ROCs) that will carry out common cross-border capacity calculation and thus will have strong influence on the actual NTC offered by the TSOs.

Balancing

The new proposal will shift the outfitting and procurement of balancing capacities traditionally done by TSOs at the national level to the ROCs. This is expected to lower the procured volume of balancing capacities and reduce the associated procurement cost owing to an increased pool of potential bidders. On the other hand, the proposal to limit the procurement of reserves to day-ahead and intraday time horizons may have an effect on bidding prices.
Generally, the separation of real time system operation from controlling the means for it (procurement of balancing reserves) at the institutional level (TSO vs ROCs) might increase operational risk for the electricity network. The mechanism by which the activation of

TABLE 1: POTENTIAL MEASURES TO ADDRESS LOOP-FLOWS

			Impact of commercially available NTC	Impact of electricity wholesale price
Readily available measures	Topology measures		–	no
	Currently operating phase shifters		↑	yes
	Redispatch		–	no
	Countertrading		–	yes
	Virtual phase shifters		↑	yes
	NTC limitations	Ex-ante	↓	yes
		Ex-post	↓	yes
Future measures	Regulatory	Review of bidding zones	↑	yes
		Flow-based NTC allocation	↑	yes
	Infrastructural	New phase shifters	↑	yes
		New grid elements	↑	yes

balancing reserves will impact available cross-border capacities at the regional level is still unclear.
The Electricity Balancing Guideline takes a more gradual approach to the standardization of balancing products and hence prefers the integration of balancing energy markets. The Winter Package takes a much bigger step by regionalizing the balancing capacity market, likely requiring the reduction of NTC for commercial purposes, which is something that the package sought to avoid.
In sum, the proposal maintains the policy objective of electricity market integration but emphasizes a top-down approach as opposed to the gradual harmonization of these markets via common methodological tools (grid model) and jointly established institutions (RSCs) defined in the grid codes. ROCs will take over balancing capacity management duties from TSOs that will remain responsible for the secure operation of the network.

Questions:

- Compared to the present bottom-up approach of balancing energy market integration (via RSCs), can the benefits of a top-down approach (by ROCs) out-weight the additional risks and costs of such an approach?
- Who in the region will be the potential winners and losers of such a shift in market integration policy?

RESOURCE ADEQUACY AND CROSS-BORDER CAPACITY REMUNERATION SCHEMES: OPTIONS AND ALTERNATIVES

The Winter Package envisions a decarbonised electricity system in Europe with a 50% share of largely intermittent renewables by 2030, which will lead to extended periods of low wholesale electricity prices given the near zero marginal cost of RES-E generation. At the same time, it confirms that the default market design is electricity-only whereby flexibility providers, including conventional backup generation to RES-E, earn their revenue from unregulated price spikes. This would mean an electricity market with very high wholesale price volatility and the subsequent risk for investors in conventional generation capacity. While RES-E generation can enter and operate in the market through capacity auctions and production support, conventional generators must take the full risk of a highly volatile electricity market with no payment for their availability.
In CSEE there is an elevated concern over generation adequacy and especially over the sufficiency of investment incentives for new conventional generation. Poland had a blackout in the summer of 2015 that has led to mounting concerns over its electricity system security, and consequently it is so far the only country in the region that has opted for the introduction of a

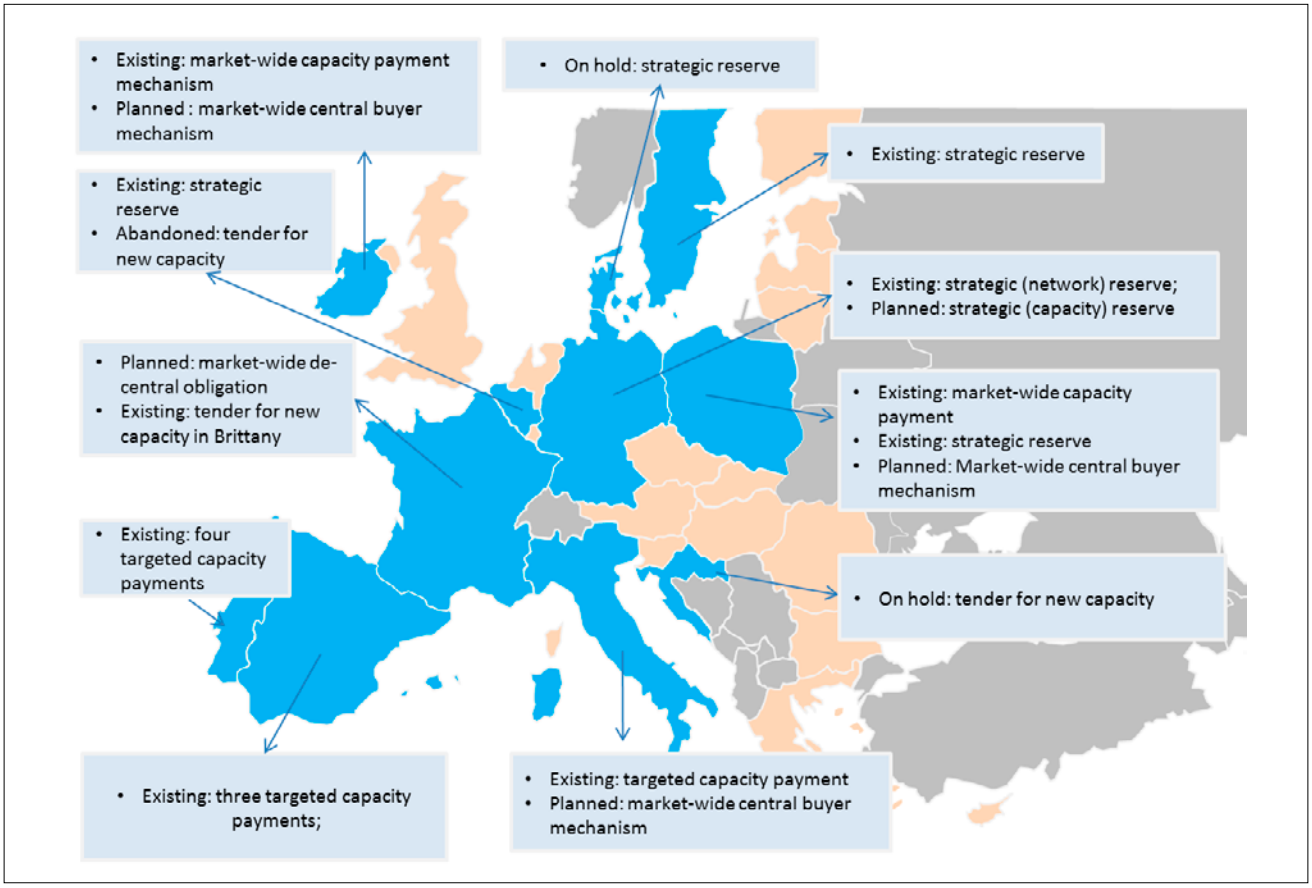

FIGURE 1: EXISTING AND PLANNED CRMS IN THE EU
Source: Final Report of the Sector Enquiry on Capacity Mechanisms, EC, 2016

market-wide capacity payment (Figure 1). The severely cold weather in January 2017 resulted in high regional wholesale prices and led to temporary protectionist measures as some countries restricted electricity exports to neighbours.
Narrow or negative capacity margins estimated by REKK's European Electricity Market Model (EEMM) further reflect a tight generation market and consequently increasing reliance on import capacities for many CSEE countries (Figure 2).[1]

The outlook for new generation investments in the region is already gloomy. While generous RES-E subsidies and ad-hoc capacity remuneration mechanisms introduced all around Western Europe might provide cheaper electricity import opportunities for the region in the short run, these measures further deteriorate generation investment incentives in CSEE. Investment conditions for the most essential backup capacities for renewables, such as gas fired CCGTs, is further weakened by relatively high gas prices, the prospect of restored Russian gas supply dominance and related price risks for the region due to the planned Nord Stream 2 project.
The Winter Package proposes to introduce a Europe-wide resource adequacy assessment prepared by ENTSO-E as a precondition for a member state to introduce a CRM in the future. In its 2016 supply security assessment (MAF[2]) ENTSO-E replaced its former

1 Capacity generation margin equals to available generation capacity in a given reference hour minus consumption divided by consumption. If the value is higher than zero, than the in the reference hour the country can satisfy its domestic consumption by domestic generation, otherwise the country is import-dependent. In the EEMM 90 reference hours are modelled, including peak and off-peak hours. Reference hours well represent demand seasonality. We calculated the capacity margin for each reference hours. To better demonstrate the results, we depict the lowest 5 reference hour out of the 90.

2 Mid-term adequacy forecast report (MAF), ENTSO-E at: https://www.entsoe.eu/outlooks/maf/Pages/default.aspx.

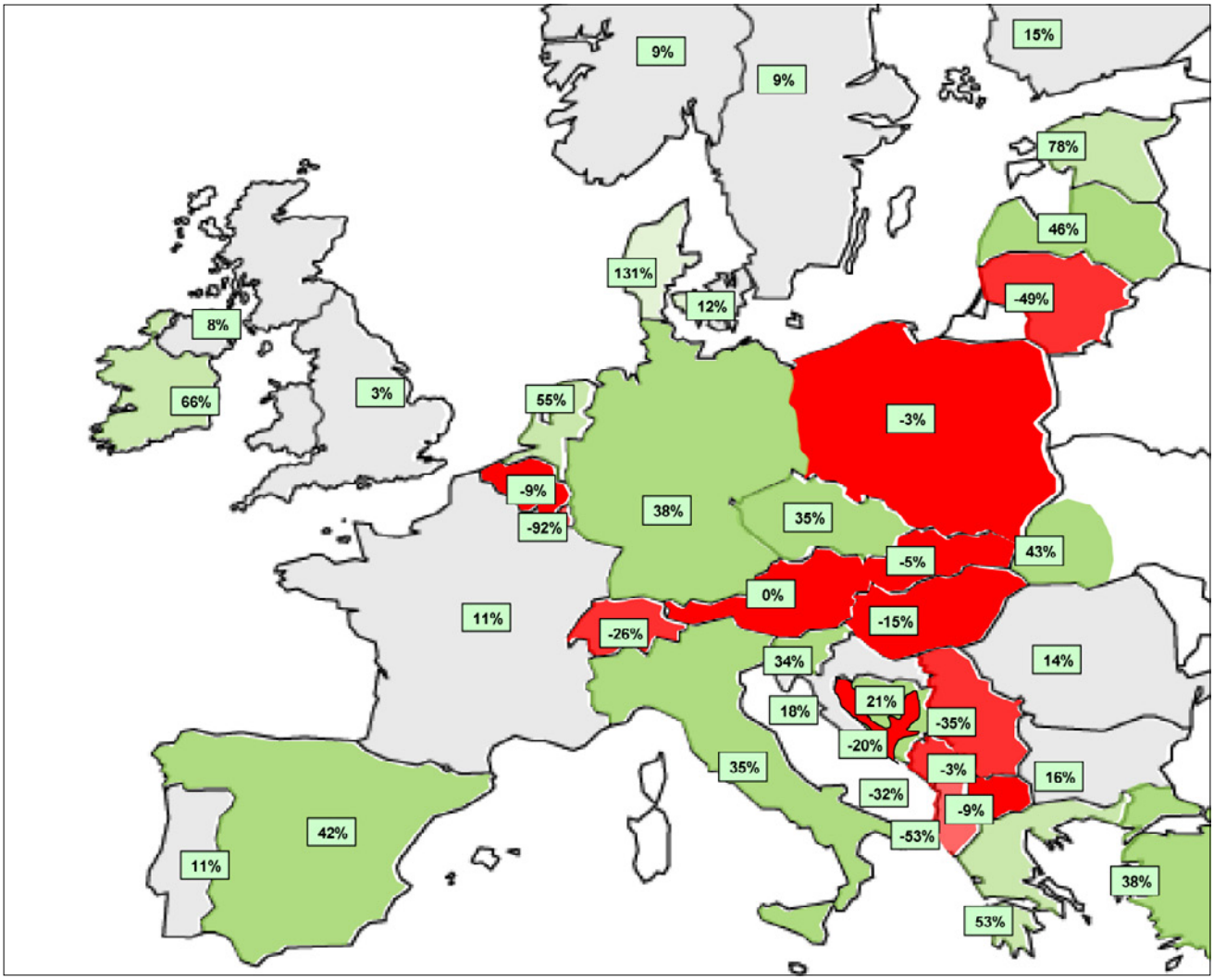

FIGURE 2: CAPACITY MARGIN IN EUROPEAN COUNTRIES, 2016 (Capacity margin, %)
Source: REKK EEMM model estimations

generation adequacy assessment – mainly a country level deterministic approach based solely on available capacity calculations – with a resource adequacy assessment using probability modelling technics.[3] Consequently, reports up to 2015 identified the extent of import dependency of the given countries and the method after aims to determine the probability that a given country won't be able to satisfy its demand considering cross-border flows.

One of the most important indicators of MAF modelling is the loss of load expectation (LOLE) which shows the expectation of unsatisfied demand hours in the given country. The left-hand side map of Figure 3 shows the LOLE values for the different countries in 2025 assuming that operational reserves are not considered and no random HVDC outages occur.[4] In countries marked with green the LOLE in 2025 is less than one, in those marked with yellow the value is between one and ten while in red countries it is greater than ten; thus green represents low, yellow as medium and red as high generation adequacy risk countries.[5]

The right-hand side map on Figure 3 presents the LOLE values when operational reserves were considered as capacities available to meet peak load. LOLE values decrease significantly by this change and the inclusion of HVDC outages does not affect the results significantly. We may conclude that there is no mid-term resource adequacy problem in CSEE countries with perhaps the exception of Poland and Greece while other regions, including NWE may face resource adequacy risk by 2025. Comparing countries with resource adequacy problems identified by the 2016 report to those that were identified as import dependent countries in the 2015 generation adequacy report (Belgium, Croatia, Germany, Denmark, Finland, Greece, Italy, Poland, Slovakia[6]) suggest that the level of interconnectivity will be of crucial importance in ENTSO-E's future Europe wide resource adequacy assessments that will not leave much room for CRM in this relatively well interconnected region of the EU.

Questions:

- Whether strong interconnectivity in the region supporting resource adequacy can counterbalance the effects of weak generation investment incentives as a consequence of moderate RES-E ambitions, CRMs introduced in other regions, gas market distortions and coal phase-out policies?
- To what degree national governments will tolerate a situation with limited or no control over local electricity supply security?

THE FUTURE OF REGULATED RETAIL ELECTRICITY PRICES IN CSEE

Many European countries and US states apply price regulation to household consumers. In these states, the energy component is regulated alongside network tariffs and taxes.

In some countries end user prices are pegged to wholesale price levels, leaving limited freedom for regulatory intervention. Other countries allow diversion from wholesale electricity price to a certain extent due to social or political considerations. The strength of regulatory control differs greatly under the various

3 The objective function of the models is to minimize costs.

4 The MAF reports the average LOLE values of the four models as a main indicator. We think this approach is methodologically questionable as in three of the cases hydro optimization is modeled differently. For this reason, we only worked with the average LOLE value of two models (one of each type). This is the reason why the values presented on the map are higher than in the MAF.

5 The one-hour threshold was used in MAF. It is important to note however that – as it is stated in the report – the choice of this number has no strong theoretical background. The ten-hour threshold was introduced in this paper to further distinguish between countries.

6 These are the countries which will rely on import in at least three months in 2025 according to the 2015 report.

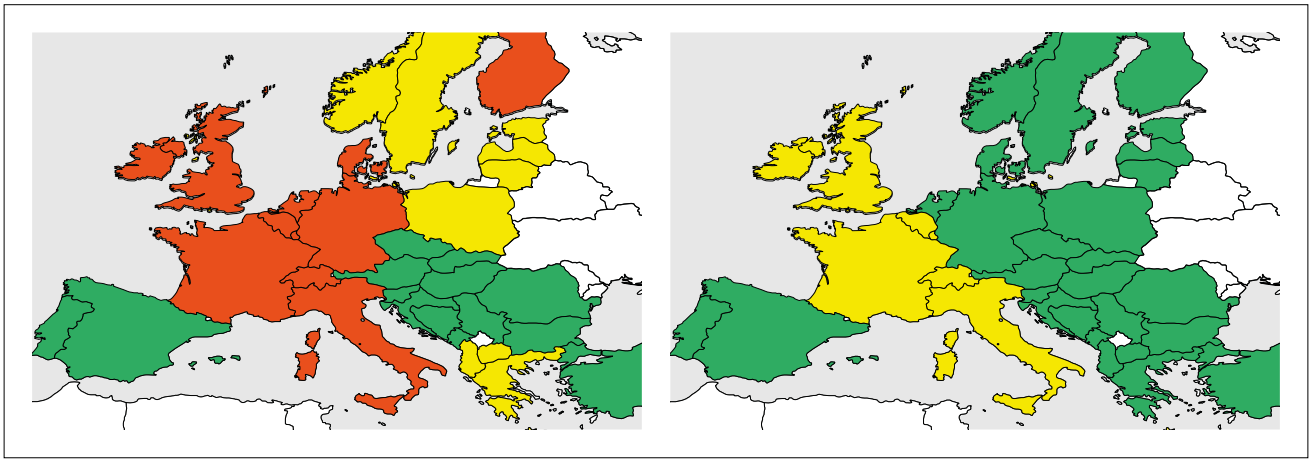

FIGURE 3: LOLE VALUES UNDER DIFFERENT ASSUMPTIONS, 2025
High risk Medium risk Low risk

Source: Mid-term adequacy forecast report (MAF), ENTSO-E, 2016

regulatory regimes; 'soft' regulation allows considerable freedom for suppliers to determine the user prices of their services (guided by previously agreed price-setting methodology or by some price indexing methods), while under 'hard' regulation the ministry responsible for energy determines end-user prices.

The most frequent reasoning for end-user price regulation arises from scepticism that market mechanisms alone can to guarantee economically 'reasonable' and 'affordable' prices for the majority of end-users. Concentrated market structure or less favourable regulatory environment of the retail markets (e.g. highly demanding rules in consumer service obligations, depressed retail prices or other regulatory elements preventing new entry to the retail market) can indeed lead to unreasonable prices set above the justified costs of services to end users. The ACER MMR reports over the last four years shows evidence that this remains an issue in many European countries, as household retail prices continuously increase in spite of wholesale prices undergoing significant reductions in this period (MMR 2012-2015). On the other hand, many studies (including the MMRs) point to the steeply increasing RES support need that may explain most of the end user price increase.

Regulators also intervene in competitive retail markets in special cases, such as when passive consumers are overpriced or when service provision for vulnerable consumers is at risk.[7] Studies carried out on the retail electricity market in the UK show discriminative pricing tendencies for passive and vulnerable consumers.

The proposed electricity market directive would make a drastic change to price regulation by barring all types of regulated retail tariffs with the exception of 'vulnerable consumers' for a transitional period, although the vulnerable consumer group is not defined in the proposal.[8]

The fundamental argument against price regulation is that it artificially reduces prices for consumers and limits switching rates, reducing the efficiency of market competition. Some countries allocate their cheapest electricity generation portfolio at a reduced price to suppliers of household consumers. Negative or close to zero margins between the energy part of retail and wholesale prices are observable in several East European countries, further undermining competition. At the same time, some countries maintained 'soft' retail price regulations for many years without jeopardising the competitive market functioning.[9]

The Commission's argument focuses on the impact of price regulation on retail price development, claiming that if regulators prevent or smooth direct price impacts (e.g. by capping prices at low levels) it reduces demand responsiveness which would significantly increase RES integration costs or require capacity payments for fossil based generation (mainly gas) to provide the required flexibility services.[10]

Are all forms of retail price regulation irreconcilable with competition and demand side responsiveness? Consumers can engage in flat rate price contracts in competitive markets, and many of them indeed use this type of contract. At the same time, many regulated price systems allow for the use of real time signals in the pricing method, e.g. when only the margin is regulated but the energy component of the price follows wholesale price trends.

The dilemma of 'price regulation vs. competition' should not be viewed as a problem with only two mutually exclusive options. Different market environments might call for diverging solutions, e.g. illiquid wholesale market or concentrated market structure are examples of market distortions where price regulation has to be maintained for a longer period.

A good example is Ireland, where the regulator placed three preconditions to remove price regulation: (1) at least 3 suppliers are active on the market and minimum of 2 independent supplies (each with at least a 10% market share); (2) incumbent BG Energy's market share must be less than 50% on non-domestic sector (and 60% on domestic sector) (3) switching rate must be greater than 10%.

The transition from regulated prices to competition requires smooth evolution of regulatory tools, with well-defined milestones for changing from one stage to the next, and where social intervention is possible in the interest of some (well defined) vulnerable groups. In addition, maintaining competition requires regulatory oversight of the markets (e.g. ex-post market monitoring) and other interventions (operation of price-comparison tools, designation of last resort suppliers) in order to prevent market failures.

Questions:

- What type of price regulations are the most market friendly? Which regulatory forms have the least distorting effects, e.g. concerning demand side response (DSR) or RES integration?
- What are the 'lessons learnt' from those countries having experiences in the transition from regulated to competitive prices?
- What type of conditions should be fulfilled in order to have a smooth and efficient transition between pricing regimes?
- What could we learn from the US and UK experiences in this respect?

7 It is a frequent practice that suppliers have to take public service obligations (when member states designate supplier of last resort or default supplier), or there are special rules for vulnerable consumers (most popular: preventing or limiting disconnection).

8 Although present practice would describe who is a vulnerable consumer and the tools applied for their protection, but it is not straightforward how exactly vulnerable consumer could be defined on a wider geographical scope.

9 Several states of Australia maintained retail price regulation for many years after market opening before it was completely removed. The regulator advised to the government to remove retail energy price regulation where effective competition can be demonstrated. See experience of Ireland.

10 The EC proposal commits itself to the competitive price setting with demand side response' option compared to the 'price regulation with capacity mechanisms' option.

CONTACT

Péter Kaderják is the Director of the Regional Centre for Energy Policy Research at the Corvinus University of Budapest. He received his MSc in economics from the Budapest University of Economic Sciences in 1987. In 1998 he was appointed as Chief of Cabinet of the Minister of Economic Affairs and started to work on the liberalisation of the electricity and gas sectors in Hungary. In January 2000 he became the President of the Hungarian Energy Office, the national energy regulator. Between 2000 and 2004 he also served as the Chairman of the Energy Regulators Regional Association (ERRA), an association of energy regulatory institutions of countries from Central and Eastern Europe, the CIS and South East Europe. Since 2004 he has been serving as Training Director for ERRA's in-house energy regulatory trainings. He is also directing a postgraduate program in Energy Economics at Corvinus University since 2010.

Lajos Kerekes has been with REKK since 2010. He was educated as an economist and received his degree from the Budapest University of Economic Sciences in 1998. Before joining REKK he worked 8 years for the Hungarian Energy Office, where he headed the Department for Economic Analysis and Environmental Protection (2009-10) and led a team assessment of significant market power in the electricity and gas wholesale and retail markets that was drafted into the NRA Decision. With REKK he has led several projects: the evaluation of the Hungarian energy strategy; development of market modelling options for the Hungarian natural gas market; analysis of target model for European natural gas and electricity market integration; mapping the process of supplier switching and advising its regulation (2010).

REKK FOUNDATION

The goal of the REKK Foundation is to contribute to the formation of sustainable energy systems in Central Europe, both from a business and environmental perspective. Its mission statement is to provide a platform for open-ended, European-wide dialogue between government and business actors, infrastructure operators, energy producers and traders, regulators and consumers, professional journalists and other interested private entities. The Foundation will develop policy briefs and issue papers with forward-looking proposals concerning challenges posed by energy and infrastructure systems and organize regional forums allowing stakeholders to become familiar with the latest technological and regulatory developments within the industry.

For further information please visit: *www.rekk.org*