MARKET REPORT 2014
NATIONAL REPORT TO THE EUROPEAN COMMISSION

E-CONTROL

STEERING THE TRANSITION – WHEREVER THE MARKET NEEDS NEW RULES

WORKING FOR YOU – WHEREVER YOU NEED ENERGY

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KEY MARKET DEVELOPMENTS IN 2013

Electricity and gas market indicators

ELECTRICITY INDUSTRY: KEY INDICATORS
In 2013 domestic electricity output dropped from 72,390 GWh to 68,015 GWh, a fall of 6% or 4,376 GWh. Meanwhile, Austrian electricity consumption rose slightly, by 0.4%.

The country's hydropower stations generated a total of 45,698 GWh, a year-on-year decline of 1,920 GWh, mainly as a result of the lower water yield in the second half of the year. Output at thermal power plants was down by 3,295 GWh or 31.4%, with gas-fired stations accounting for the majority of the decrease. Renewables were the only energy source to record a rise in output. Wind farms generated 3,150 GWh of electricity and photovoltaic (PV) plants 295 GWh.

ELECTRICITY INDUSTRY IN 2013 – KEY INDICATORS

	GWh (2013)	Change vs. 2012
Gross electricity generation	68,015	–6.0 %
Physical imports	24,960	+6.5 %
Physical exports	17,689	–14.2 %
Consumption from pumped storage	5,374	–3.4 %
Domestic electricity consumption	69,912	+0.4 %
Average peak load on third Wednesday of each month	10,872	–0.6 %

Table 1
Electricity industry in 2013 – key indicators

Source: E-Control

GAS INDUSTRY IN 2013 – KEY INDICATORS

	GWh (2013)	Change vs. 2012
Imports	519,262	+15.0 %
Production	14,525	–28.2 %
Withdrawals from storage	68,207	+47.5 %
Exports	451,356	+22.4 %
Injections to storage	60,521	+13.5 %
Own use, losses and statistical adjustments	3,280	
Supplies to consumers	86,890	–4.6 %
Max. daily consumption	489.4	–20.5 %
Min. daily consumption	80.5	–19.4 %

Table 2
Gas industry in 2013 – key indicators

Source: E-Control

Low wholesale prices led to widespread substitution of domestic gas- and coal-fired generation by imports from Germany.

GAS INDUSTRY: KEY INDICATORS

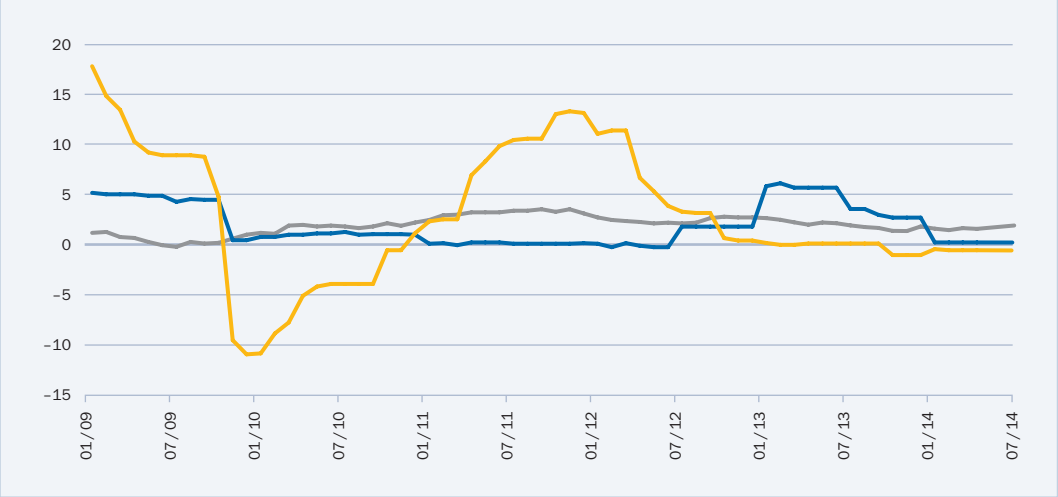
In 2013 total domestic natural gas supplies to consumers decreased by 4.6% to 86,890 GWh. As in the previous year, a fall in the use of gas-fired power stations played a significant part in this development. Domestic gas production went down by 28.2% to 14,525 GWh, while physical gas imports jumped by 15% to 519,262 GWh. Exports surged by 22.4% to 451,356 GWh.

Gas exports exceeded imports in the first quarter of 2013, as withdrawals from the large-scale Haidach and 7Fields storage facilities (parts of which are linked solely to the German grid) were delivered to Germany.

PRICE TRENDS IN 2013

The consumer price index for natural gas remained relatively steady over the year as a whole. Between October and December 2013 gas price inflation slipped by more than one percentage point, to –1%. Gas prices remained virtually unchanged throughout the first half of 2013. Electricity price inflation was a mere 0.2% between January and May 2014, after reaching a 2013 high of 6.2% in February last year.

CHANGE IN OVERALL CPI VS. ELECTRICITY AND GAS PRICE INDEXES, %



Source: Statistics Austria

Chart 1
Changes in the Austrian consumer price index (CPI), and the electricity and gas price indexes, % (2000=100)

Key market developments

ELECTRICITY MARKET

The range of products on offer in the retail market grew by more than a third compared with the previous year. The switching rate also increased markedly year on year, from 1.1% to 1.9%. However, it is still in the low single-digit bracket and well below the rates seen in other highly developed European markets. Last year 114,235 electricity customers switched to a new supplier, including 78,083 households. The churn rates in Lower Austria, Upper Austria and Styria were above the national average (see Chart 2). The number of customers changing supplier reached a new record in the first quarter of 2014 – of the 91,400 switchers in the period, 71,000 were households, and 68,000 of the new supply contracts were concluded under the Austrian Consumers Association's (VKI) Energiekosten-Stop campaign[1], which was aimed at helping large numbers of consumers to secure lower energy bills. However, cross-border competition would probably result in an even higher churn rate. The maximum potential saving from switching from the regional incumbent to an alternative supplier has doubled since 2011.

To counter the trend towards increased control reserve and balancing energy costs, E-Control mounted a high-intensity information campaign designed to attract new players to the Austrian control reserve market. We also implemented other measures, such as

HOUSEHOLDS SWITCHING GAS OR ELECTRICITY SUPPLIER IN 2013, BY FEDERAL PROVINCE, %

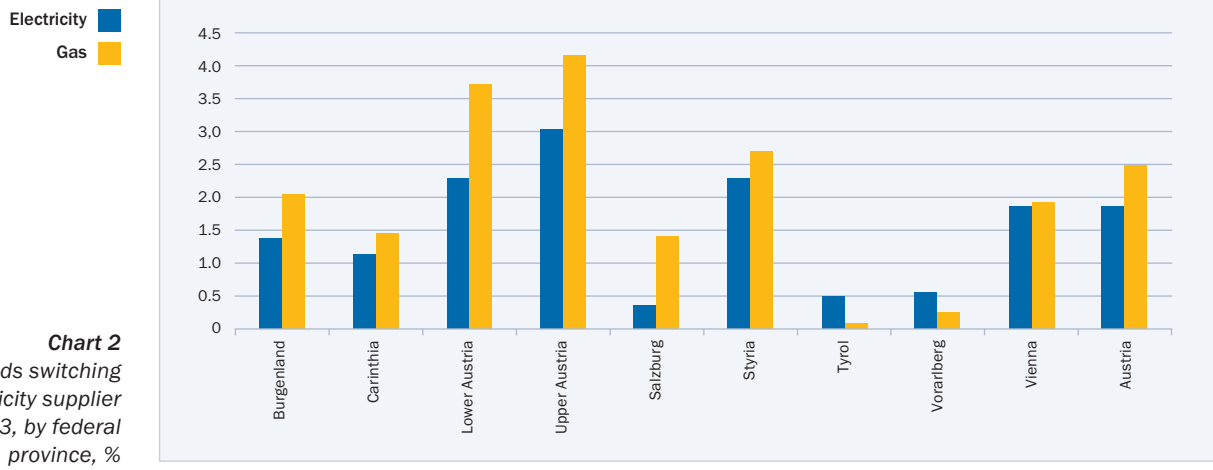


Chart 2
Households switching gas or electricity supplier in 2013, by federal province, %

Source: E-Control

[1] In mid-December 2013 the VKI organised a best-bidder procedure involving several energy suppliers. The winning bids were those submitted by stromdiskont.at for electricity, and goldgas for gas. By 16 December over 260,000 consumers had registered for the non-binding campaign. Some 98,000 electricity and gas supplier transfers had been completed by the middle of April 2014.

initiatives aimed at integrating the control energy market with neighbouring markets.

These include an imbalance netting cooperation (INC) programme launched in May 2013 with Slovenian transmission system operator (TSO) ELES, under which power surpluses or shortfalls in a control area are balanced by means of transfers to or from another control area, with a view to reducing call-offs of secondary control energy. This has already generated cost savings of several million euros. In 2014 this partnership was extended to other neighbouring countries, including Germany, as part of the International Grid Control Cooperation (IGCC) initiative, which is likewise aimed at cutting balancing energy costs. An E-Control study has shown that concentration is relatively high in the short-term wholesale electricity markets, with the exception of day-ahead auctions. The closer a particular market segment to the point of physical settlement, the higher the concentration ratio. This is due to the fact that the intraday/control reserve market, with the exception of primary control power, is restricted geographically to the APG delivery area, and that the number of potential participants in these markets is limited owing to the complex technical requirements for generating stations associated with physical settlement. With regard to intraday trading on the EPEX exchange, it should be noted that in principle, Austrian market participants can indirectly take part in intraday trading in a German delivery area. Over-the-counter (OTC) trading gives market participants additional leeway, compensating for the liquidity shortfall in exchange-based intraday trading. This is not the case on the control reserve market, meaning that the high degree of concentration keeps the lid on competition.

In addition, a competitive wholesale market is dependent on prices which accurately reflect the demand and supply situation. Analysis has shown that injections of wind and PV power have a significant impact on wholesale day-ahead electricity prices and on trading volumes. Prices on the day-ahead market and power station availability are the main influences on intraday market prices. New information on wind farm and PV plant availability, which has an impact on intraday trading thanks to improved forecasting, also plays a part. In contrast, it is unclear which factors influence pricing on the less liquid control reserve market.

GAS MARKET

Discounts and rebates are still the main form of price differentiation used by alternative suppliers in the retail gas market. However, the frequency of such campaigns has risen significantly. A total of 31,051 households changed supplier in 2013, a year-on-year increase of 47%. The number of switchers in the first quarter of 2014 was equal to the combined figure for the first two quarters of the previous year. The majority of these transfers (approximately 30,000) came as a result of the VKI's Energiekosten-Stop campaign. Thanks to the new market model, all consumers in Vorarlberg and Tyrol are now

able to change supplier. Nevertheless, the overall switching rate remained at a low 2.5%. The highest rates were recorded in Lower and Upper Austria (see Chart 2).

The percentage full rate at Austria's gas storage facilities rose sharply year on year to reach 91% at the start of the 2012/13 gas year. The cold weather in February and March, which persisted into April 2013, significantly extended the withdrawals season, and the refilling of storage facilities only began at the end of April. The relatively high level of balancing energy sales in December 2013 reflected the unusually mild winter up to that point. Many companies were probably oversupplied and were forced to sell gas on the spot market.

Since April 2013, rights to the transportation of gas between two market areas have been allocated through the European PRISMA[2] platform, where TSOs from Austria and other countries market transmission capacity for cross-border gas shipments. In early 2014 a secondary market was set up on the platform for the unlimited resale of such transportation rights. The various capacity products on PRISMA are bought and sold at auctions.

As the transparent and efficient allocation of capacity is extremely important both for gas trading and for Austria's access to European gas markets, the gas transmission market was subjected to closer inspection. A detailed study carried out by E-Control looked at the outcomes of auctions held on the PRISMA platform, taking into account price differentials between the various markets, as well as regulated charges and capacity utilisation. At Austria's three largest cross-border interconnection points (Arnoldstein, Überackern and Oberkappel) a price mark-up was observed on days when utilisation and price differences are so high that capacity is seen as a highly valuable commodity. The mark-up at Oberkappel is almost in line with the price differential, but this is not the case at Arnoldstein. However, it should be noted that in Italy, tariffs include a volume-based "commodity" component which was not considered in the analysis. The price markup in PRISMA capacity allocation reflects the congestion rent for shippers that would have received capacity under a different mechanism, e.g. on a first come first served basis.

[2] https://www.prisma-capacity.eu

Major regulatory developments

In 2013 our activities focused primarily on the third incentive regulation period for electricity, the second incentive regulation period for gas, and the new gas market model.

THIRD INCENTIVE REGULATION PERIOD FOR ELECTRICITY

The third incentive regulation period for electricity began on 1 January 2014. Incentive regulation now covers a significantly larger number of electricity distribution system operators (DSOs). Their cost base is determined at the start of each regulation period. The third regulation period introduced new parameters for the next few years. The most important changes relate to the calculation of efficiency scores, the redetermination of the frontier shift (1.25% p.a.), the weighted average cost of capital (WACC, 6.42% p.a.), calculation of the annual inflation rate (system operator price index), implementation of the regulation account and the treatment of inherent time lags (of two years). The regulation period ends on 31 December 2018, by which time companies are obliged to have eradicated half of the inefficiencies determined prior to the period.

SECOND INCENTIVE REGULATION PERIOD FOR GAS

The second incentive regulation period has defined the regulatory system for gas distribution networks since 1 January 2013. The regulatory framework was modified slightly for the second incentive regulation period, which ends on 31 December 2017, and the charges for 2013 were set using the adjusted system for the first time. Although the efficiency target to be achieved by the end of 2017 remained unchanged, the cost trajectory was adapted in light of a cost review for the 2011 financial year and of target attainment. Both the system expansion factors (operating cost and investment cost factors) and the weighted average cost of capital have been revised.

ADAPTATIONS TO THE NEW MARKET MODEL

The new gas market model was introduced on schedule in eastern Austria on 1 January 2013.

Based on initial experience, two rounds of amendments to the *Gas-Marktmodell-Verordnung* (Gas Market Model Ordinance) were implemented. These raised the threshold for end users subject to daily balancing from the original standardised load profile (SLP) threshold to the contractually agreed maximum capacity of 10,000 kWh/h, as well as introducing minor adjustments to the system, mainly in relation to obligations regarding data transmission between market participants, which came into effect on 1 October 2013. The third wave of amendments to the Ordinance came into force on 1 January 2014. These concentrated on the difficulties clearing and settlement agencies experience in forecasting the results of monthly balancing

power settlement, and on the related effect on the market area's contribution accounts.

On the whole, the new market model has been well received by Austrian and foreign market participants, and has also sparked greater competition in Austria.

NEW MARKET MODEL IN TYROL AND VORARLBERG

The Cross-border Operating Strongly Integrated Market Area (COSIMA) gas market model was introduced in the Tyrol and Vorarlberg market areas on 1 October 2013. This removed the barriers between the two provinces and the NCG market area by giving suppliers an exemption from the need to reserve capacity. COSIMA was designed not to trigger a need for significant amendments to the existing regulations in the neighbouring market areas. The new market model has already generated tangible benefits – since its implementation, the number of suppliers operating in Tyrol and Vorarlberg has risen.

Consumer protection

The protection afforded to gas and electricity consumers was extended by a series of measures introduced in 2013. Under the amended *Elektrizitätswirtschafts- und -organisationsgesetz* (Electricity Act) and *Gaswirtschaftsgesetz* (Natural Gas Act), consumers are now entitled to a prepayment meter if their system operator or supplier demands a deposit or prepayment. Another innovation is the requirement for larger suppliers to set up customer service and advice centres by 2015. These centres will provide consumers with information on various topics including switching supplier, energy efficiency and energy poverty. Online switching, whereby a consumer submits an informal declaration of intent electronically to a new supplier, has now been established by law.

In 2013, our monitoring activities provided the first detailed insights into the core concerns of consumer protection. Provincial authorities are responsible for overseeing the electricity market, but monitoring the gas market falls under E-Control's remit. According to company information, gas suppliers received a total of around 21,500 complaints and distribution system operators 1,340. While only 168 prepayment meters are currently installed, some 8,457 consumers were disconnected in 2013 due to breach of contract, mainly for payment default. This corresponds to a disconnection rate of around 0.7%.

THE AUSTRIAN ELECTRICITY MARKET

Network regulation

ELECTRICITY SYSTEM CHARGES REVIEW PROCEDURE AS PART OF INCENTIVE REGULATION

E-Control has determined the network tariffs for the electricity transmission and distribution systems on a regular (normally annual) basis since the market was liberalised in 2001. Although the transmission grid is still governed by a cost-plus regulatory regime (where revenues follow costs), at the start of 2006 the distribution systems switched from a cost-plus approach to stable, long-term incentive regulation. In this form of regulation the link between companies' actual costs and their allowed revenue is broken for the duration of the regulation period. The audited cost base is adjusted annually, using escalation and offset factors which essentially reflect price increases in the industry (i.e. inflation), as well as industry and company-specific productivity trends.

The second incentive period expired at the end of 2013 and the third period commenced on 1 January 2014. In order to give all stakeholders the opportunity to comment on the regulatory system, a public consultation was held on two key papers. There has been a significant increase in the number of DSOs covered by the incentive regulation system, as the Electricity Act 2010 states that all those with supply volumes of over 50 GWh in 2008 must be included. Under incentive regulation, the cost base is determined at the start of each regulation period. A review of electricity DSOs' costs was carried out in 2013 (based on data from 2011), and the findings were applied for the first time during the 2014 tariff determination exercise. At the same time we conducted an efficiency benchmarking procedure to compare the companies' costs and cost drivers with those of other system operators. Taking the audited cost base for 2011 and the results of the benchmarking exercise as a starting point, trajectories were set for attainment of the target efficiency levels by the end of the regulation period, whereby the companies must eliminate at least half of the identified inefficiencies.

This established an initial cost base for the third regulation period, which ends on 31 December 2018, and new regulatory parameters for the next five years. The most important changes relate to the calculation of efficiency scores, the redetermination of the frontier shift (1.25% p.a.), the weighted average cost of capital (WACC, 6.42% p.a.), calculation of the annual inflation rate (system operator price index), implementation of the regulation account (see also gas network regulation) and the treatment of inherent time lags (of two years).

As in the second regulation period, so-called "system expansion factors" (investment and operating cost factors) will be applied during the third period. These factors create incentives to invest by outlining as far as possible the changes in operating and finance costs during the regulation period.

In 2013 transmission system operators were still not subject to individual benchmark-based productivity requirements. Instead, their costs are adjusted each year on the basis of an efficiency factor of 2.5% p.a. and an inflation rate calculated using the system operator price index, as is the case in the distribution network. However, consideration of individual efficiency requirements is planned for the future. The budgeted cost of large-scale investment projects is included in the regulatory asset base.

This system is based on section 59 Electricity Act 2010, which requires the allowed cost from which the system charges are derived to be reflective of actual costs and to be determined separately for each network level. Only costs that are reasonable in terms of their origins and amount are allowable. Reasonable investment costs must be allowed, taking account of both historical costs and the cost of capital. The cost calculations must be based on targets aligned to the potential efficiencies achievable by the companies. The costs determined must be adjusted for general targets reflecting productivity trends, and for changes in the system operator price index. Individual targets may be set on the basis of the efficiency of each system operator. In its allowed cost decisions, the regulatory authority can divide the time allotted (target attainment period) for meeting the targets into single-year or multi-year regulatory periods. If amounts charged on by a vertically integrated electricity undertaking influence the costs of a system operator, the latter must furnish adequate evidence that the parent's charges are justified. To prevent cross-subsidisation, the vertically integrated electricity undertaking must submit documentation evidencing the basis of calculation underlying the charges in question at the request of the regulatory authority.

DETERMINATION OF SYSTEM CHARGES

With effect from 1 January of each year, the annual audited costs of the transmission grid are converted into system charges and redetermined. As required by the Electricity Act 2010, during the 2013 system charges review procedure the cost structures of all electricity distribution system operators that supplied over 50 GWh in 2008 were determined, and the tariffs for 2014 calculated. Since 2011 this has been a two-stage process, which gives the system operators greater legal security. During the first stage E-Control establishes the system operators' cost structures by issuing official decisions. These lay the basis for computation of the system charges as established by ordinance, which represents the second step.

The amendments to the system charges (grid utilisation charge and charge for grid losses) brought about by the *Systemnutzungsentgelteverordnung 2012-Novelle 2014* (2012 Electricity System Charges (Amendment) Ordinance 2014) resulted in an average reduction of about 2.3% (for the whole of Austria, across all network levels,

on the basis of supply volumes in 2011). The grid utilisation charges are influenced by a number of factors, including investment costs and volume trends. In addition, the cost audit carried out in 2013 in order to determine the initial cost base for the third regulation period beginning on 1 January 2014 led to a drop in the grid utilisation charges in most grid zones. A considerable increase in the system charges in the Vienna grid zone came mainly as a result of a massive rise in the uncontrollable costs referred to by section 59(6)(6) Electricity Act 2010. There was a huge fall in the charges for grid losses (except in Vorarlberg), which was primarily attributable to a drop in the procurement prices paid by system operators in relation to system losses. The continued need for investment and the increases in system operators' costs will limit the scope for reductions in the electricity system charges over the next few years. Stagnant supply volumes in recent years mean that there is no prospect of a reduction in the volume-related charges.

AUSTRIAN SYSTEM CHARGES, cents/kWh

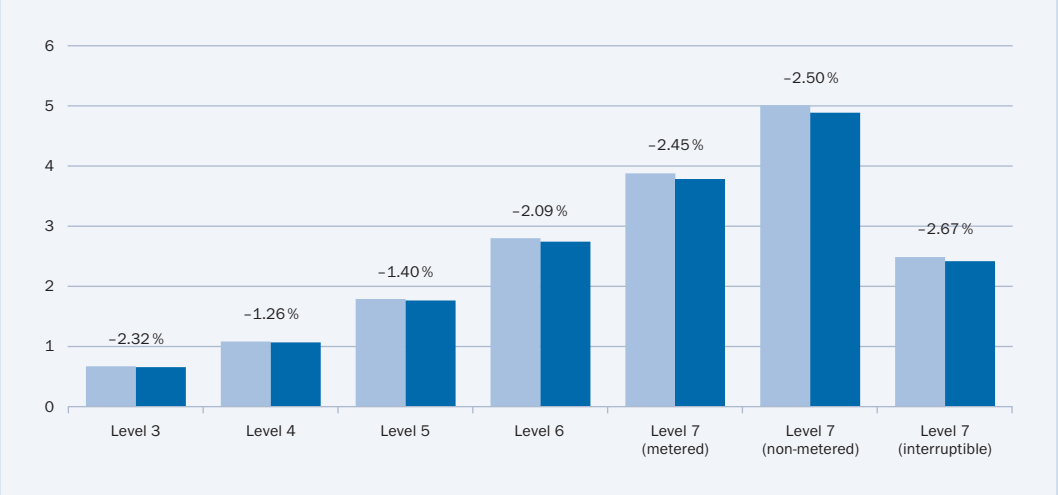


Chart 3
Distribution system charges by grid levels

Source: E-Control

INVESTMENT BY ENERGY COMPANIES

Investment in electricity networks: status quo

Austrian economic growth remained steady year on year in 2013, at a modest 0.4%[3]. According to the Oesterreichische Nationalbank (OeNB), the depressed European Union economy was the main reason for this near-stagnation.[4] This had an impact on direct investment from Austria and abroad, which fell by 0.7%, leading to a reluctance to invest and an associated investment backlog. Consumption was equally subdued, and remained at the previous year's level. The chart below shows the changes in gross fixed investment in each quarter of 2012 and 2013. A weak first half of 2013 was followed by an upturn in expenditure in the second half.

The recovery in the global and European economies was reflected in Austria's positive economic performance from mid-2013 onwards. Industrial businesses with a focus on exports were the main beneficiaries of the rise in demand in the European Union.[5] The OeNB expects investment to pick up shortly on the back of this distinctly upbeat mood. The current low interest rate and the attractive financing conditions on offer as a result – as well as the increased need for replacement investment – will also play an important part.

Investment in electricity network infrastructure

Electricity market liberalisation and the rapid changes it brought about have placed significantly higher demands on transmission and distribution network infrastructure. Power

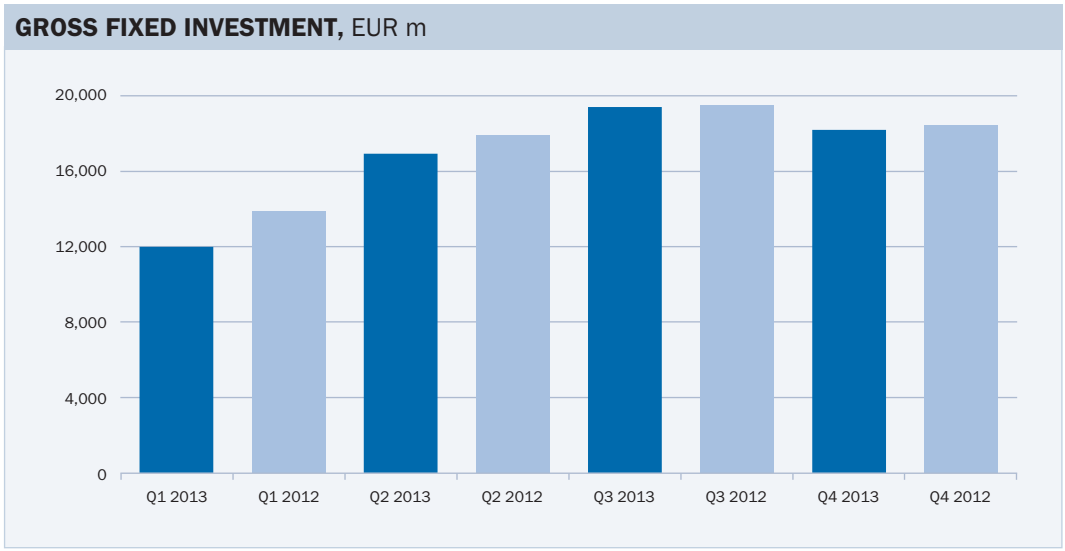


Chart 4
Gross fixed investment

Source: OeNB and Statistics Austria (nominal figures)

[3] Source: Statistics Austria, National Accounts 2013
[4] Source: OeNB, 2014, http://oenb.at/en/Monetary-Policy/Economic-Outlook-for-Austria.html, accessed 16 May 2014
[5] Bank Austria Economics & Market Analysis, Austrian Economy, September 2014

station use determined by market prices, coupled with rising electricity consumption, new power station projects and the huge expansion in renewable generation have resulted in high loads and costly congestion. Consequently, expansion of the network is essential in order to guarantee supply security in the future.

Overall, investment by electricity system operators in 2013 was similar to that in the previous year, with the primary focus on renewing power lines and extending capacity. Investment in smart technologies (such as smart meters and smart grids) climbed sharply year on year, though it remains at a low level. The majority of projects currently under way in the transmission system are aimed at expanding transformation facilities and boosting network capacity. Investment in the electricity grid is expected to remain unchanged or increase in 2014, mainly as a result of the aforementioned modification of network infrastructure, as well as the growing demand for capacity and system connections resulting from the transportation of renewable energy on the distribution network. As far as the transmission system is concerned, it remains to be seen whether investment in the 380 kV loop, in the shape of implementation of the controversial Salzburg II 380 kV line project, is given the go-ahead. This would prompt a surge in investment in the transmission system over the next few years.

NET INVESTMENT IN ELECTRICITY NETWORK DEVELOPMENT, EUR '000

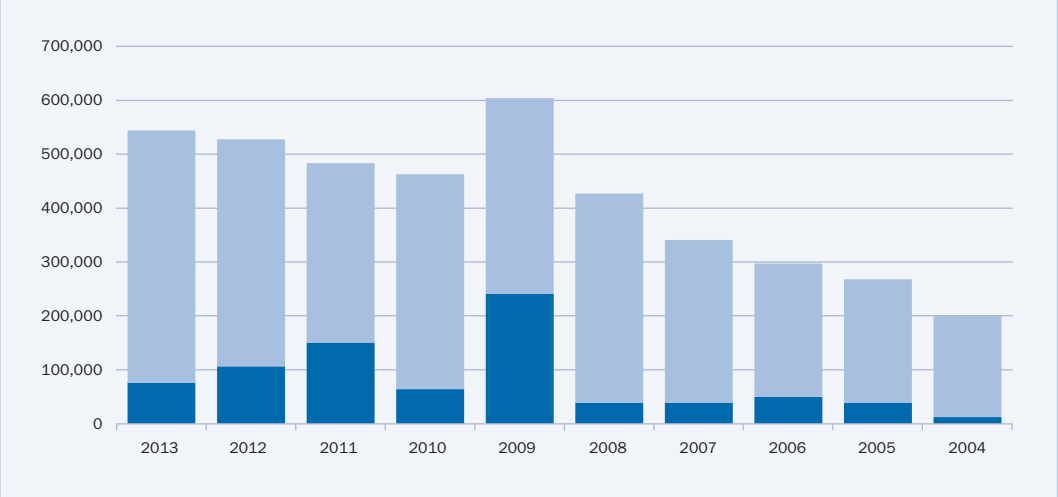


Chart 5
Net investment in electricity network development incl. distribution and transmission system operators

Source: E-Control (aggregate company data, 2013 survey; historical costs)

Chart 5 shows investment in the electricity distribution and transmission networks over the past ten years. Investment by Austrian electricity system operators rose steadily during the period. This was a response to rising energy demand and to the regulatory framework, which provides for compensation in the form of cost-reflective system charges, as well as the necessary incentives that promote timely investment.

MARKET MECHANISMS

Balancing market

In Austria, gaps between forecast and actual power generation and electricity consumption are balanced by injecting or withdrawing control energy. Depending on the duration of these deviations, a variety of assets and products are employed, namely:

- Primary control: used to offset imbalances within the first 30 seconds of their occurrence;
- Secondary control: used where imbalances last for more than 30 seconds, progressively replacing primary control;
- Tertiary control ("minute reserve"): takes over from secondary control where imbalances persist for longer than 15 minutes.
- Unintentional exchanges: occur where it is not possible to adjust to an imbalance sufficiently or at all within the control area concerned, and the balance is therefore restored by inadvertent exchanges with surrounding control areas in the ENTSO-E grid.

Deviations from the schedule submitted by a balance group, for example owing to divergence from forecasts, necessitate balancing energy. The net balancing energy required by all the balance groups in a control area is the control energy demand, which must be met by the control area manager. Unlike in most other EU member states, in Austria financial accounting for balancing energy is performed by an independent clearing and settlement agent appointed by the control area manager. Since the commencement of the cooperation agreement between APG and Vorarlberger Übertragungsnetz GmbH (VÜN), Austrian Power Clearing and Settlement (APCS) has performed this task for the whole of Austria.

The market rules for balancing energy are laid down by the Electricity Market Code and by the clearing and settlement agent's general terms and conditions. The regulator draws up the market rules in consultation with the market participants, and approves APCS's terms and conditions.

The control area manager APG procures the control reserve products by holding competitive tenders. Contracts for the supply of primary and tertiary control energy have been awarded in this way since 2010 and 2001 respectively. Secondary control energy was procured by way of bilateral contracts with power station operators until 1 January 2012, when the changeover to a competitive tendering mechanism took place. Unintentional exchanges in the ENTSO-E

interconnected grid are made good by a compensation programme, operated via the EXAA power exchange.

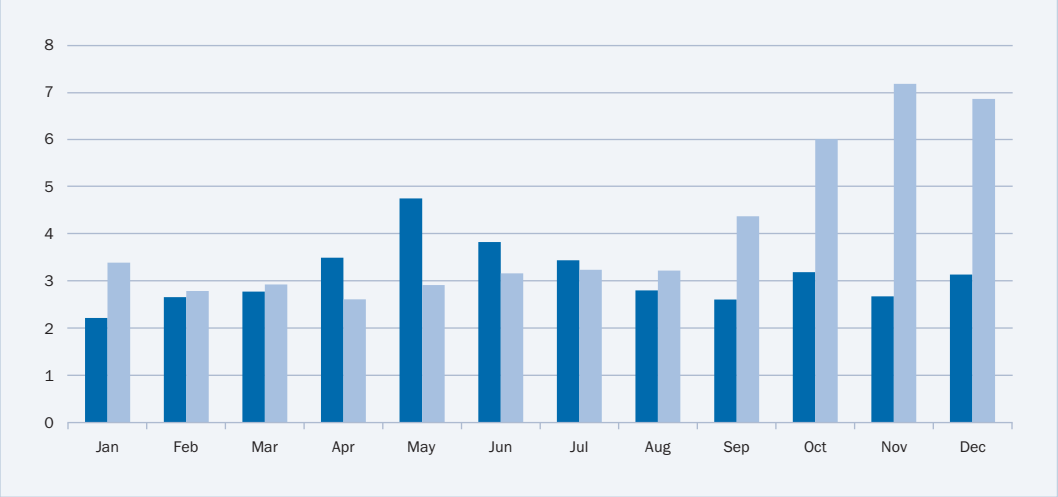
Because of the strict technical requirements that generating stations must meet to take part in the control reserve market, the number of potential suppliers in Austria is limited. This is particularly true of the primary and secondary control markets. The clearing and settlement agents calculate the balancing energy clearing prices on a quarter-hourly basis. The prices consist of the following components:

> The cost of the market maker's services and of calling off tertiary control energy;
> 22% of the cost of providing standby capacity and calling off secondary control energy;
> The cost of unintentional exchanges.

These costs are apportioned to quarter-hourly balancing energy volumes using a predefined price formula, and invoiced to the balance responsible parties. Suppliers usually take account of balancing energy costs and the associated risk when setting their retail prices. However, none of the balancing energy cost components are directly charged on to consumers.

Chart 6 shows the evolution of balancing energy costs in 2012 and 2013. As can be seen from the chart, costs rose sharply year on year from September to December 2013. This mainly reflected a significant increase in the cost of providing standby capacity and calling off secondary control energy. In 2013

MONTHLY BALANCING ENERGY COSTS, 2012 AND 2013, EUR m



Source: APCS

Chart 6
Monthly balancing energy costs, 2012 and 2013

balancing energy costs climbed to EUR 50.4 million (m) (2011: EUR 37.7m).

To counter this trend, E-Control mounted a high-intensity information campaign designed to attract new players to the Austrian control reserve market. We also took other measures, including: an investigation into potential barriers to market entry, and where appropriate their removal; steps to promote demand-side participation in the control reserve market; amendments to the market rules, made in consultation with the control area manager; and initiatives aimed at integrating the control reserve market with neighbouring markets. We launched an imbalance netting cooperation (INC) programme in May 2013 with Slovenian TSO ELES, under which power surpluses or shortfalls in a control area are balanced by means of transfers to or from another control area, with a view to reducing call-offs of secondary control energy. This has already generated cost savings of several million euros. We plan to extend this form of cooperation to other neighbouring countries. The initiatives launched in Austria with the aim of stimulating the control reserve market, and our current and planned international partnerships will keep the costs for control energy in check.

Supply interruptions

In line with the *Elektrizitätsstatistikverordnung* (Electricity Statistics Ordinance), each year E-Control publishes the results of its analysis of the disturbances (i.e. supply interruptions) recorded in Austrian grid zones. Since 2002 the data required for these reports have been collected in collaboration with the country's system operators and the Austrian electricity industry association, Oesterreichs Energie. As all of the country's system operators have participated in these surveys since 2003, they permit comprehensive monitoring of supply reliability. Any worsening of performance in a given year is quickly spotted, triggering a rapid response.

The scope of the surveys and the evaluation of data on outages and interruptions changed with the implementation of the *Netzdienstleistungsverordnung Strom 2012* (Ordinance on Electricity System Service Quality 2012), which came into effect in July 2013: the natural disasters category was replaced by the term "exceptional regional event", which is precisely defined in the Ordinance. System operators must report outages of this kind separately and give an explanation for them.

Starting with the 2015 survey, all system operators will be obliged to submit figures for the SAIDI and ASIDI reliability indicators for the previous calendar year, as well as publishing the figures on their websites. If the SAIDI and ASIDI indicators do not exceed 170 minutes and 150 minutes, respectively, for the year (based on a three-year sliding average), a grid will be judged to have good security of supply.

In addition, and likewise from the 2015 survey onwards, system operators must

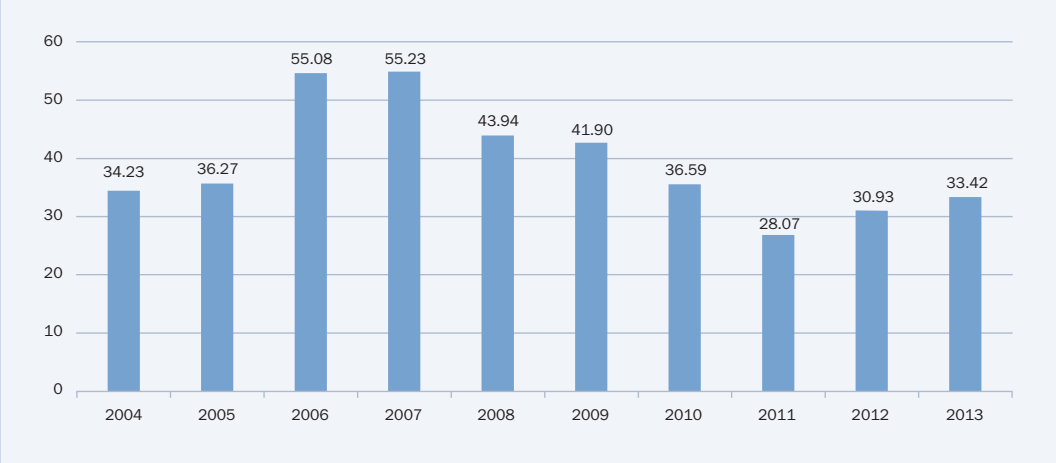
record outages lasting more than one second (compared to the previous three minutes) and to notify the regulator of these. This framework will ensure that all electricity supply interruptions of over one second which originate in the medium or high voltage network and have implications for system operators as well as high, medium and low voltage customers will be recorded in the surveys.

Based on the evaluation of the data for 2013 and taking into account all supply interruptions in Austria, the customer-weighted interruption index (SAIDI) came to 47.58 minutes (excluding exceptional regional events). Here, the reference value is the total number of system users. By this measure, planned interruptions totalled 14.16 minutes and unplanned interruptions 33.42 minutes.

Figure 7 shows the annual unplanned interruptions to consumer supplies for the 2004-2013 period. Natural disasters (exceptional regional events), such as the severe flooding in Austria in 2005 and 2011, the Europe-wide interruption on the ultra-high voltage grid on 4 November 2006, the Kyrill, Paula, Emma and Andrea storms in 2007, 2008, 2009 and 2012, and the floods in June 2013, are reported separately. The 2013 survey results show little change in non-availability as compared to previous years.

In 2013 Austria experienced total electricity supply interruptions (excluding exceptional

ANNUAL UNPLANNED CUSTOMER-WEIGHTED ELECTRICITY SUPPLY INTERRUPTIONS, minutes



Source: E-Control

Chart 7
Customer-weighted system average interruption duration index (SAIDI) for unplanned interruptions in Austria (excl. exceptional regional events)

regional events), as measured by the capacity-weighted average system interruption duration index (ASIDI), of 50.18 minutes. The reference value for this calculation is the installed nominal apparent power of the country's transformers. Planned interruptions amounted to 16.22 minutes, and unplanned interruptions to 33.42 minutes.

Figure 8 shows the annual unplanned capacity-related interruptions between 2004 and 2013. Once again, exceptional regional events were not taken into account. These results also show little change in non-availability in comparison with the previous years.

Technical cooperation between TSOs in Austria and third countries

The Austrian transmission grid's central position in the closely integrated European network means that detailed technical cooperation between TSOs is essential. The trend towards renewable energy sources and market integration are creating greater operational challenges and placing new demands on such partnerships. The network codes provided for by the third energy package will establish a new legal basis for technical collaboration between TSOs. The technical network codes on operational security, operational planning and scheduling, load frequency control and reserves, requirements for generators and demand connection were

ANNUAL UNPLANNED CAPACITY-WEIGHTED ELECTRICITY SUPPLY INTERRUPTIONS, minutes

Chart 8
Capacity-weighted average system interruption duration index (ASIDI) for unplanned interruptions in Austria (excl. exceptional regional events)

Source: E-Control

jointly compiled by all TSOs – with Austrian transmission system operator Austrian Power Grid (APG) playing a leading role in some instances – coordinated by ENTSO-E.

The European Commission is currently preparing the draft codes for adoption by the member states via the comitology procedure. The codes will lay the foundations for more standardised and formal technical cooperation, leading to an improvement in supply security.

APG has intensified its ongoing operational collaboration with a large number of continental European TSOs (from Croatia, the Czech Republic, Denmark, Germany, Hungary, the Netherlands, Poland, Slovenia and Switzerland) under the TSO Security Cooperation (TSC) initiative. The partnership has been significantly strengthened with the establishment of a joint central office in Munich, which is responsible for coordinating operational reliability and enhancing the exchange of data. This will be facilitated by a shared IT platform designed to support day-ahead and intraday operational planning. Coordinated multilateral remedial actions continue to be used as a means of eradicating security risks. The TSOs involved in the TSC programme have devised a set of allocation keys for sharing the costs arising from the implementation of measures. As the complexity of this issue proved to be an obstacle to arriving at a generally accepted solution, the TSOs and the regulators are still involved in discussions. As a result, the test phase has been extended and any costs will be borne by the TSOs which request such measures until a decision is reached.

Quality standards

The EU service quality legislation was transposed into Austrian law by section 19 Electricity Act 2010. The *Verordnung des Vorstands der E-Control über die Qualität der Netzdienstleistungen 2012* (E-Control Executive Board Ordinance on Electricity System Service Quality 2012), based on these provisions, was published in December 2012 and came into force on 1 July 2013.

The Ordinance deals with both commercial and technical network service quality standards.

The commercial quality standards relate to:
System admission and access:

- Deadlines for cost estimates
- Deadlines for responses to applications for system admission/access
- The minimum information required for applications

Billing for system services:

- Deadlines for billing and corrections to invoices

Supply disconnections and restoration:

- Supply restoration
- Option of paying outstanding amounts in cash

> No disconnections on grounds of breach of contract ahead of weekends and public holidays

The Ordinance also imposes safety, reliability and service quality standards on system operators, including:

> The duration and frequency of supply interruptions
> Deadlines for repairs
> Notice of supply interruptions
> Deadlines for answering enquiries
> Complaints management practices
> Power quality

Other indicators of compliance with the standards established by the Ordinance were also included. The system operators concerned must send these figures to the regulator and publish them on an annual basis.

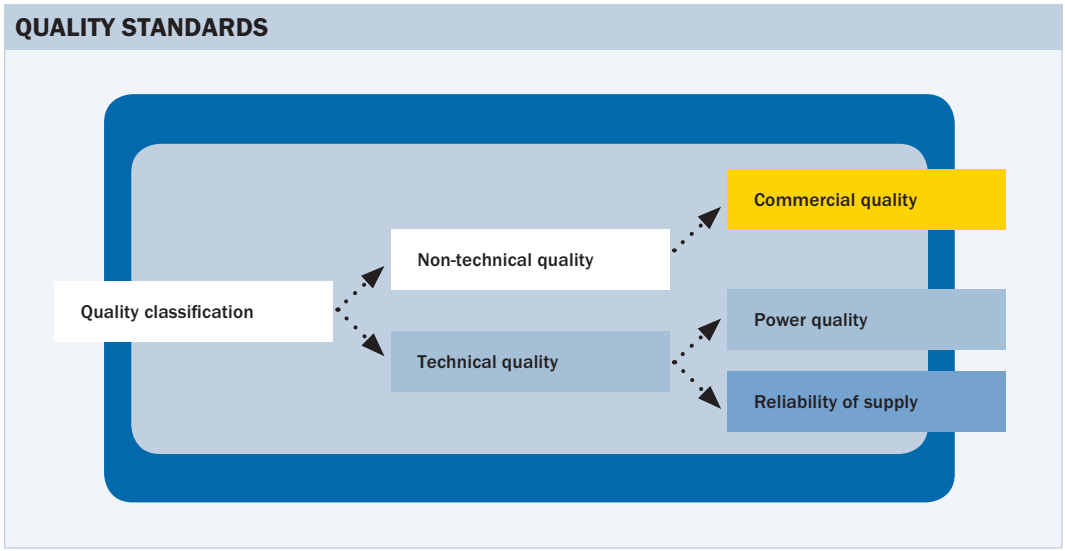


Chart 9
Quality standards

Source: E-Control

Emergency intervention measures

Under the *Energielenkungsgesetz 2012* (Energy Intervention Powers Act 2012) as amended by Federal Law Gazette (FLG) I No. 41/2013, E-Control is responsible for the preparation and coordination of the main intervention measures to be taken in response to emergencies in the electricity and gas sectors. The necessary data are collected under the *Energielenkungsdaten-Verordnungen* (Energy Emergency Data Ordinances).

The enactment of a new Energy Intervention Powers Act was necessary owing to the implementation of Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply, and to the numerous amendments to the Energy Intervention Powers Act 1982. Following a series of changes in wording and legislative adjustments, the fact that the electricity, natural gas and district heating sectors are closely interwoven, and that shortages in one sector can have implications for the others, was addressed by extending E-Control's emergency intervention powers for securing electricity and gas supplies to key aspects of district heating supply.

The Act specifies three main responsibilities:

- Preparing intervention measures
- Implementing intervention measures, and
- Monitoring intervention measures

In order to meet these responsibilities, E-Control is required to collect data which

- where possible, demonstrate the likelihood of a crisis situation arising
- describe the actual and target level of supply
- form the basis of decision-making on any necessary responsive measures, and
- enable monitoring of the effectiveness of the steps taken, and compliance with them

E-Control also carries out regular trial data transfers in collaboration with market participants and public authorities in order to prepare for situations of reduced supply. These are designed to evaluate the processes linking federal, provincial and district authorities, particularly with regard to general restrictions on provincial consumption and the implementation of rationing for some industrial facilities. The insights gained from these exercises are now under discussion and will influence future activities.

CROSS-BORDER CAPACITY AND CONGESTION MANAGEMENT

Art. 37 Electricity Directive (2009/72/EC) confers approval powers on the national regulatory authorities in respect of access to cross-border infrastructure. As part of the implementation of the third energy package these provisions were transposed by section 23(2) Electricity Act 2010. The control area managers submitted their auction rules to E-Control for approval, which was initially granted on application in 2012. In 2013, more detailed rules for the Central Eastern Europe (CEE, covering the borders with the Czech Republic, Hungary and Slovenia) and the Central Southern Europe (CSE, covering the borders with Italy and Switzerland) regions were approved by official decision. These amended rules include improvements to the provisions for billing, capacity curtailments in the event of critical network situations and the secondary trading of allocated rights. Rules for the allocation of intraday cross-border capacity with Switzerland were also approved.

Congestion at the borders with the Czech Republic, Hungary, Italy, Slovenia and Switzerland is still managed by means of coordinated auctions. The scarce capacity there is assigned by the Central Allocation Office (CAO), which is the single point of contact for market participants throughout CEE.

Work on developing a load-flow-based market coupling procedure for the CEE region based on the capacity management target model was given a new and more effective structure. A memorandum of understanding signed by the region's TSOs, electricity exchanges and regulators, as well as the Agency for the Cooperation of Energy Regulators (ACER), paved the way for agreement of further objectives for the project. E-Control coordinated the drafting of the memorandum. Consultations on a time schedule and the main elements of the project are currently in progress, with implementation likely in 2016 following a test phase. In this regard, coordination with the Central Western Europe (CWE) region plays a vital role. Thanks to its location in the heart of Europe, Austria is increasingly involved in the region's activities. Larger quantities of data on the Austrian grid will be transferred directly to the CWE region for use in load-flow-based capacity calculations, which are scheduled to begin at the end of 2014.

As a consequence of the common price area with Germany, Austria is also taking part in an expanding market coupling initiative with the North West Europe (NWE) region consisting of the CWE region, the UK and Scandinavia. This is giving rise to a core geographic area for coordinated day-ahead markets where an identical price calculation algorithm and identical trading rules apply. The inclusion of additional markets will bring about the gradual integration of markets across Europe.

In the CSE region, during the reporting period the CASC-CWE auction office continued to allocate capacity, applying rules that have been harmonised with those of the CWE region. The market coupling project was more clearly defined within the existing project framework. The regulators involved have given their backing to the plan submitted by the power exchanges and the TSOs, and are supporting the implementation process. As things stand, the project will go live at the start of 2015 at the earliest.

MONITORING OF TSOS' INVESTMENT PLANS FOR CONSISTENCY WITH THE TYNDP, PURSUANT TO ART. 37(1)(G) ELECTRICITY DIRECTIVE

Under section 38 Electricity Act 2010, E-Control is required to approve the ten-year network development plans submitted by Austria's TSOs. These plans must be compiled annually and presented for approval, and they are subject to public consultation. During the approval procedure, the plans are checked

for consistency with the applicable European ten-year network development plan (TYNDP). Since the entry into force of Regulation (EU) No 347/2013, there has been a stronger focus on projects of common interest (PCIs) which have been given or are seeking PCI status.

In line with the required procedure, consultations on the network development plans submitted by APG and VÜN were held with various interest groups and the plans were assessed in terms of their economic viability and technical necessity.

CROSS-BORDER COOPERATION WITH OTHER NRAS AND PUBLIC AUTHORITIES

Cooperation between national regulatory authorities (NRAs) and public authorities takes place at various levels, from bilateral to regional and Europe-wide. The aims of bilateral communication with neighbouring regulators included furthering cooperation on control energy and redispatch arrangements, and preparing for the implementation of the new network codes. Operational agreements have been reached with Germany, Slovenia and Switzerland for the exchange of control energy, and this has led to significant cost savings. The regional initiatives remain a platform for cooperation within the various regions, but they are also increasingly becoming the basis for cross-regional partnerships, such as the NWE day-ahead market coupling and the NWE+ intraday projects. In the latter, Austria is involved in developing an intraday platform for EU-wide price determination and the allocation of network capacity.

Competition

ELECTRICITY SUPPLY AND DEMAND

Electricity demand

In 2013 domestic electricity consumption totalled 69.9 TWh, an increase of 0.3 TWh or 0.4% year on year. Power withdrawn from the public grid was 1.1 TWh or 1.8% higher than in the previous year, at 61.5 TWh. This difference in consumption trends may be the result of economic factors which mainly affected industrial companies' generation of electricity for own use. In seasonal terms, the largest changes were recorded in the winter, when weather conditions have the strongest influence – this was the main reason for the consumption increase of between 1.9% and 2.8% in January, March and November, and for the majority of the decline in February and December.

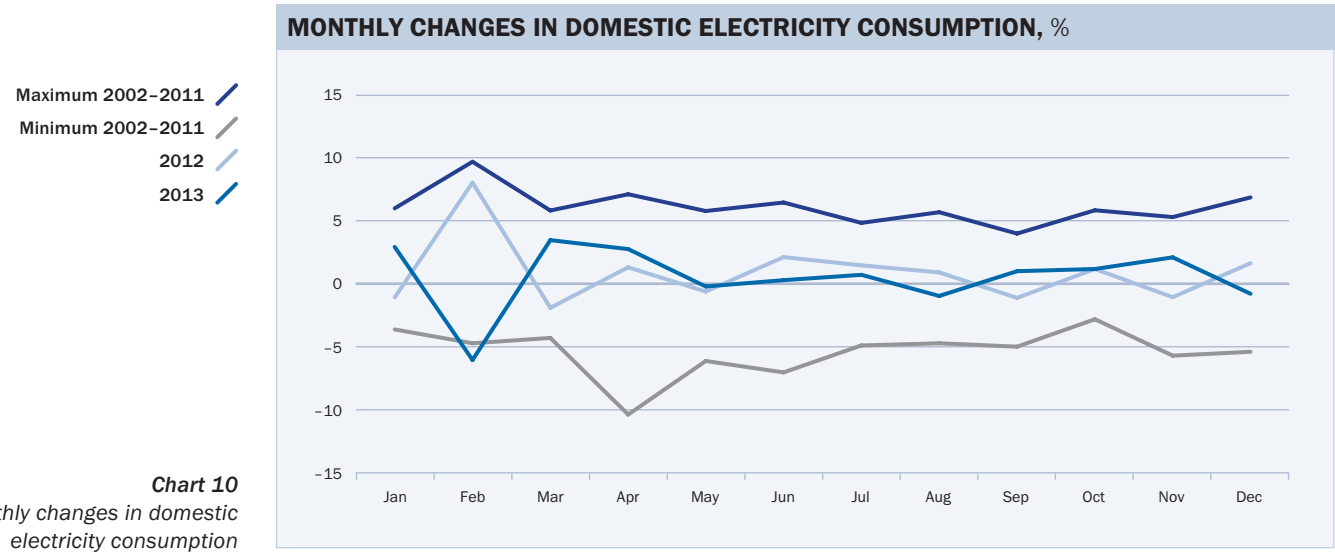


Chart 10
Monthly changes in domestic electricity consumption

Source: E-Control

Electricity generation
In 2013, domestic electricity output declined from 72.4 TWh to 68.0 TWh, a fall of 6.0% or 4.3 TWh. Hydropower generation went down by 1.9 TWh to 45.7 TWh, and there was a similar decrease in output at run-of-river and storage power stations. Thermal power stations produced 3.3 TWh less, for a total of 18.8 TWh. Natural gas-fired plants accounted almost exclusively for this drop, with output down by 3.0 TWh or almost one-third to 6.6 TWh. Only renewables recorded a rise in output – wind parks produced some 3.2 TWh, an increase of 28%, while PV generation more than doubled to 0.3 TWh. Biofuels contributed 3.2 TWh to total electricity production, roughly the same amount as in the previous year.

Table 3 shows a breakdown of total output in 2013 by generating components.

Regarding the structure of the various generating components, the main change has been the shift from fossil fuels to renewables such as wind and PV. During the year, the share of the former slipped by three percentage points to around 20%, while the latter contributed an additional 5.1%, a rise of 1.5 percentage points. In spite of the comparatively large fall in hydropower generation, its share of the total actually increased by 1.4 percentage points to 67.2%.

ELECTRICITY OUTPUT IN 2013

Generating component			2012 GWh	2013 GWh	Change GWh	Change %
Hydropower stations	Run-of-river power stations	10 MW and over (1)	26,317	25,409	–908	–3.4 %
		up to 10 MW (1)	5,188	5,140	–48	–0.9 %
	Pumped storage power stations	10 MW and over (1)	15,569	14,610	–959	–6.2 %
		up to 10 MW (1)	544	539	–5	–0.9 %
	Total hydropower stations		**47,618**	**45,698**	**–1,920**	**–4.0 %**
Thermal power stations	Fossil fuels and derivatives	Hard coal	4,400	4,203	–197	–4.5 %
		Brown coal	0	0	0	–
		Derivatives (2)	1,834	1,894	60	3.3 %
		Oil derivatives (3)	741	692	–49	–6.6 %
		Natural gas	9,656	6,621	–3,035	–31.4 %
		Total	16,632	13,410	–3,222	–19.4 %
	Biofuels	Solid (4)	2,615	2,605	–11	–0.4 %
		Liquid (4)	0	0	0	–35.4 %
		Gaseous (4)	589	583	–6	–1.0 %
		Sewage and landfill gas (4)	49	48	–2	–3.7 %
		Total (4)	3,254	3,236	–19	–0.6 %
	Other biofuels (5)		1,395	1,394	–1	–0.1 %
	Other fuels		791	737	–54	–6.8 %
	Total thermal power stations		**22,072**	**18,777**	**–3,295**	**–14.9 %**
	of which CHP plants		18,230	15,019	–(3,212)	–(17.6 %)
Renewables	Wind (6)		2,461	3,150	690	28.0 %
	Photovoltaic (6)		124	295	171	137.5 %
	Geothermal energy (6)		1	0	0	–54.9 %
	Total renewables (6)		**2,586**	**3,446**	**860**	**33.3 %**
Other generation (7)			115	94		
Total generation			**72,390**	**68,015**	**–4,376**	**–6.0 %**

(1) The basis for allocation to the different categories is the gross capacity.
(2) Derivatives are coal products used to produce energy (e.g. hard and brown coal coke and briquettes, and coke and coking plant gas).
(3) Oil derivatives are oil products used to produce energy (e.g. fuel oil, diesel oil and liquid gas).
(4) Only biofuels in the meaning of Austrian regulations; deviations from other publications (e.g. the Austrian energy balance and international statistics) may arise as a result of differing definitions of the term "biofuel".
(5) Biofuels in the meaning of EU directives, with the exception of (3) above; deviations from other publications (e.g. the Austrian energy balance and international statistics) may arise as a result of differing definitions of the term "biofuel".
(6) Injections from accredited renewable generating stations in the meaning of Austrian regulations.
(7) Generation which cannot be broken down by primary energy source or allocated to a particular type of power plant.

Source: E-Control

Table 3
Electricity output in 2013

Hydropower generation was mainly affected by the lower water yield in the second half of the year compared to the same period of 2012. Output fell by 2.8 TWh in the second six months of the year, compared to an increase of 0.9 TWh in the first half. The amount of electricity produced by thermal power stations fell in almost every month in 2013, with a particularly sharp decline of 1.7 TWh or 24.3% in the fourth quarter. Wind power generation fluctuated during the year, but it exceeded 2012 levels throughout the second half of 2013.

Renewable electricity generation

Table 4 shows supported renewable electricity output over time. This grew by more than 15% year on year in 2013. Wind power again marked up the largest absolute increase, while PV output expanded most rapidly in percentage terms. Infeed of electricity generated from solid biomass and biogas crept up, mainly as a result of the absolute increase in the former.

Table 5 sets out the maximum capacity of generating stations under contract to OeMAG. Here, too, wind power posted the strongest growth. Installed PV capacity almost doubled between 2012 and 2013, after trebling year on year in 2012. There were only minor changes in the other forms of generating capacity. Two biogas plants with a combined capacity of 1.3 MW came onstream (see Table 6). By contrast, solid biomass capacity decreased by 3.7 MW.

SUPPORTED RENEWABLE ELECTRICITY OUTPUT, GWh

Energy source	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Wind power	366	924	1,328	1,738	2,019	1,988	1,915	2,019	1,883	2,386	2,970
Solid biomass	99	313	553	1,086	1,631	1,900	1,958	1,987	1,969	1,983	2,013
Biogas	42	102	220	358	440	503	525	539	520	554	544
Liquid biomass	2	18	33	54	71	36	39	30	12	0	0
Photovoltaic	11	12	13	13	15	17	21	26	39	101	215
Other supported renewable electricity	78	76	65	55	54	52	46	45	41	32	26
Total "other" renewable electricity	**598**	**1,445**	**2,212**	**3,304**	**4,230**	**4,496**	**4,503**	**4,647**	**4,464**	**5,057**	**5,769**
Small hydro	3,386	3,995	3,561	1,806	1,527	945	644	1,258	988	1,095	1,371
Total supported renewable electricity	**3,984**	**5,440**	**5,773**	**5,110**	**5,757**	**5,441**	**5,147**	**5,905**	**5,452**	**6,152**	**7,140**

Table 4
Supported renewable electricity output, over time

Source: E-Control

The number of generating stations attracting legally guaranteed feed-in tariffs (see Table 6) also reflects the increases in PV and wind power capacity. In all, 4,970 additional stations were placed under contract during the year; PV plants accounted for 97% of the total.

Imports and exports

In 2013, net imports nearly trebled year on year, to 7.3 TWh (2012: 2.8 TWh). Imports totalled 25.0 TWh, an increase of 1.5 TWh, while exports fell by 2.9 TWh to 17.7 TWh.

The lion's share of exchanges of electricity (imports plus exports) were with Germany (17.6 TWh), followed by the Czech Republic (10.6 TWh) and Switzerland (7.2 TWh). Austria was a net importer of electricity from the Czech Republic (10.4 TWh) and Germany (7.1 TWh), but was a net exporter to all other neighbouring countries, including Switzerland (6.7 TWh), Italy (1.5 TWh) and Slovenia (1.4 TWh).

EVOLUTION OF THE TOTAL CAPACITY OF RENEWABLE GENERATING STATIONS UNDER CONTRACT TO GREEN POWER BALANCE RESPONSIBLE PARTIES OR OEMAG, MW

	Under contract to green power balance group representatives at year end			**Under contract to OeMAG[1]** at year end							
Energy source	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Biogas	15.0	28.4	50.7	62.5	74.9	76.2	77.0	79.2	79.8	81.2	82.5
Solid biomass	41.1	87.5	125.9	257.9	309.1	311.7	313.4	324.9	325.4	319.8	321.5
Liquid biomass	2.0	6.8	12.4	14.7	16.5	14.5	9.6	9.4	9.4	8.7	5.0
Landfill and sewage gas	22.7	20.3	21.2	13.7	21.4	21.2	21.1	21.2	16.0	16.6	15.8
Geothermal energy	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Photovoltaic	14.2	15.1	15.4	15.3	18.8	21.7	26.8	35.0	54.7	172.1	323.9
Wind power	395.6	594.6	816.9	953.5	972.0	960.9	984.1	988.2	1,055.8	1,306.8	1,555.4
Total "other" renewable electricity	**491.4**	**753.6**	**1,043.4**	**1,318.5**	**1,413.6**	**1,407.1**	**1,432.9**	**1,458.7**	**1,542.1**	**1,906.2**	**2,305.0**
Small hydro up to 10 MW (supported)[2]	858.1	851.5	709.7	320.9	380.2	124.7	200.9	303.8	242.2	276.0	342.3
Total "other" renewable electricity and small hydro	**1,349.5**	**1,605.1**	**1,753.1**	**1,639.3**	**1,793.8**	**1,531.8**	**1,633.8**	**1,762.5**	**1,784.3**	**2,182.2**	**2,647.3**

1 Renewable electricity generating stations under contract to OeMAG that are already in operation
2 Excluding small hydro power stations that are not under contract to green power balance responsible parties or OeMAG, and sell their electricity at freely negotiated prices instead of regulated feed-in tariffs

Table 5
Total capacity, over time

Source: E-Control, green power balance responsible parties and OeMAG (preliminary statistics, status: April 2014)

EVOLUTION OF THE NUMBER OF RENEWABLE GENERATING STATIONS UNDER CONTRACT TO GREEN POWER BALANCE RESPONSIBLE PARTIES OR OEMAG

	Under contract to green power balance responsible parties at year end			Under contract to OeMAG[1] at year end							
Energy source	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Biogas	119	159	231	253	294	293	291	289	288	291	293
Solid biomass	27	39	68	93	115	113	118	120	121	127	129
Liquid biomass	21	34	49	45	51	47	46	46	45	41	32
Landfill and sewage gas	43	42	46	38	45	45	43	45	44	46	44
Geothermal energy	2	2	2	2	2	2	2	2	2	2	2
Photovoltaic	1,793	1,852	1,975	2,065	2,515	3,112	4,150	5,028	6,253	11,056	15,886
Wind power	97	116	133*	127	139	134	136	138	147	234	295
Total "other" renewable electricity	**2,102**	**2,244**	**2,371**	**2,623**	**3,161**	**3,746**	**4,786**	**5,668**	**6,900**	**11,797**	**16,681**
Small hydro up to 10 MW (supported)[2]	2,044	2,063	2,195	1,900	2,023	1,305	1,488	1,697	1,658	1,715	1,801
Total "other" renewable electricity and small hydro	**4,146**	**4,307**	**4,566**	**4,523**	**5,184**	**5,051**	**6,274**	**7,365**	**8,558**	**13,512**	**18,482**

* Chart derived from the guarantee of origin database; generating stations supplying power to green power balance groups as of Dec. 2005
1 Renewable electricity generating stations under contract to OeMAG that are already in operation
2 Excluding small hydro power stations that are not under contract to green power balance responsible parties or OeMAG, and sell their electricity at freely negotiated prices instead of regulated feed-in tariffs

Table 6
Number of generating stations under contract to OeMAG, over time

Source: E-Control, green power balance responsible parties and OeMAG (preliminary statistics, as of April 2014)

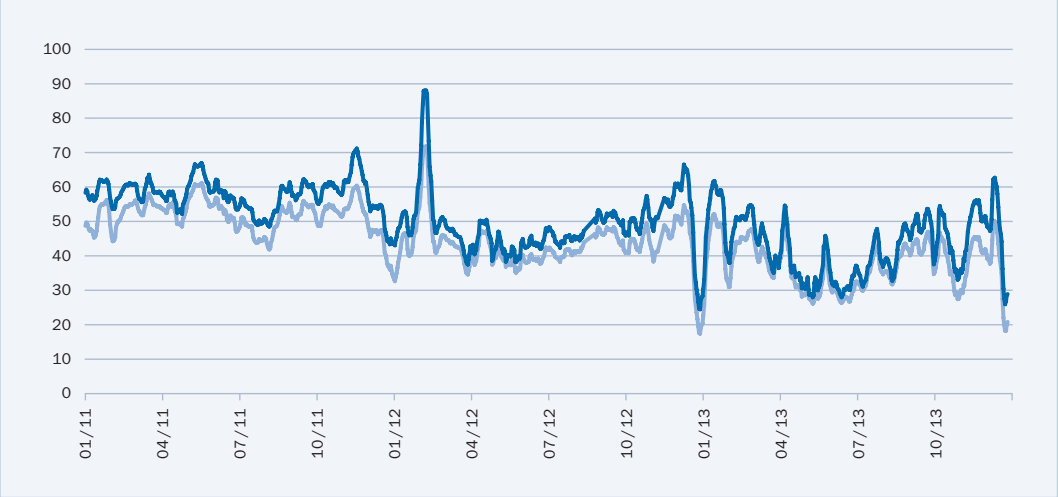
COMPETITION ON THE WHOLESALE MARKET

Monitoring results

Exchange-based day-ahead trading in the German/Austrian delivery zone takes place on the EXAA and EPEX electricity exchanges. In 2013, 7.8 TWh of electricity of unknown origin was traded on the Austrian EXAA exchange; this was also the case for 246.6 TWh of the 346 TWh total day-ahead trading volume for the German/Austrian trading zone handled at EPEX. Small quantities of renewable electricity were traded on EXAA during 2013 and, as expected, prices were subject to mark-ups compared with standard products.

The price differentials between the EXAA and EPEX markets are solely due to the different price limits and auction times on the exchanges, so the average baseload prices – EUR 37.43/MWh on the EXAA and EUR 37.87/MWh on the EPEX – only differ slightly. This represented a year-on-year fall of around EUR 6/MWh on both exchanges. Peakload

PRICES ON THE EXAA DAY-AHEAD MARKET (seven-day sliding average), EUR/MWh



Source: EXAA

Chart 11
Prices on the EXAA day-ahead market

prices averaged about EUR 42/MWh in 2013. This was relatively cheap in comparison to neighbouring market areas. For instance, baseload prices were EUR 43.24/MWh in France and EUR 44.73/MWh in Switzerland.

Chart 11 shows the evolution of prices since 2011. A significant decline in prices can be seen in the summer months in each year. The main reasons for the easing of prices were the record infeed of energy produced using cheap brown coal as well as a drop of some 1.8% in German consumption. In addition, the price of emission allowances remained extremely low throughout the year.

Trading volumes on the intraday market were considerably lower – trading on the continuous market for the German/Austrian delivery zone amounted to 19.7 TWh, although this was more than 28% higher than in the previous year. This was the outcome of the continuing increase in fluctuating injections of renewable energy and the need to restructure portfolios at short notice. For this reason, a more detailed analysis of the mechanisms that affect short-term electricity trading is provided from page 42 onwards.

The EEX futures market also saw a rise in trading volumes, with contracts concluded for a total of 1,263.9 TWh. Prices were down year on year, with a fall of around 20% for annual baseload contracts. As on the spot market, there were expectations that the bearish sentiment would prevail in the front year, due to an increase in generation from brown coal and low CO_2 emission allowance prices. Chart

EEX BASELOAD FUTURES PRICES, EUR/MWh

Chart 12
Prices on the EEX baseload futures market

Source: EEX

12 shows a tendency towards backwardation, especially from spring onwards, with contracts for delivery in 2015 trading lower than 2014 futures.

Efforts to enhance transparency on the wholesale market continue to focus on exchange-based trading, although a growing range of transparency platforms (e.g. sites operated by ENTSO-E and EEX) have already helped to bring fundamental data out into the open. However, OTC data such as volume and pricing information are only available from price assessment agencies that charge for their services.

Market concentration and liquidity
Concentration and liquidity on the wholesale market are important indicators of functioning competition. The first wide-ranging investigations of the electricity industry took place as part of the European Commission's sector inquiry (SEC(2006)1724), which concluded that the degree of competition in the wholesale market was insufficient in most market areas. Since then, a variety of legal steps have been taken, including the third energy package, and market-based and regulatory measures implemented in an attempt to breathe new life into competition on the wholesale market. In this regard, liquidity and concentration on the short-term electricity trading market, especially intraday trading and control reserve auctions, are particularly significant, and they have gained in importance with the strong growth in erratic generation.

Market concentration is determined using a range of indicators, such as the concentration ratio (CR), the Herfindahl-Hirschman index (HHI) and more specific indices including the Pivotal Supplier Index (PSI) and the Residual Supply Index (RSI).

The various calculation methods can produce contrasting results, as they employ different methodologies and in some cases use diverging requirements for the scope and quality of data. However, it is safe to assume that a market which appears to be concentrated on the basis of applying several methods must be viewed as such.[6]

Regardless of the calculation method used, before selecting the indicators, the product and geographical markets must be defined, as these can have a significant impact on results. Choosing a non-specific definition such as the European energy market would not produce any meaningful conclusions about market power and competition, as concentration would be low on account of the large number of market participants. The focus of the German Federal Cartel Office's most recent inquiry[7] into the German-Austrian power generation and wholesale markets was on generating units, since the market definition is based on first-time sales. This was justified by the fact that electricity can only be stored under certain conditions. The Cartel Office stated that pure trading activities needed to be excluded from the definition of electricity markets. For the purpose of maintaining network stability, at any one time the amount of electricity generated had to be identical with the total demand of final consumers, excluding system losses. The Office went on to say that the options for storing electricity, for instance at pumped storage stations, were currently very limited. As a result, managing the amount of electricity supplied to final consumers mainly took place through the corresponding management of generation by means of firing up or shutting down generating stations. Therefore, the Office concluded, the market for the first-time sale of electricity reflected the drivers of competition at the generating level.

In terms of geographical definition, the Federal Cartel Office assumed that the requirements for a German-Austrian market had been met. The inquiry also found that the first-time sales market was highly concentrated during the observation period, and that the four largest generators (EnBW, E.ON, RWE and Vattenfall) were "indispensable for meeting electricity demand in Germany over a significant number of hours" on the basis of the RSI and PSI.

[6] 6An overview of relevant indicators for the wholesale electricity markets can be found in part 1 of the study compiled by London Economics and Global Energy Decisions: http://ec.europa.eu/competition/sectors/energy/inquiry/electricity_final_part1.pdf

[7] Federal Cartel Office (2011), Sektoruntersuchung Stromerzeugung und Großhandel (Sector Inquiry into Electricity Generation and Wholesale Markets), p87ff.: http://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Sektoruntersuchungen/Sektoruntersuchung%20Stromerzeugung%20Stromgrosshandel%20-%20Abschlussbericht.pdf?__blob=publicationFile&v=3; English summary available at http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Sector%20Inquiry%20Electricity%20Generation%20and%20Wholesale%20Markets.pdf?__blob=publicationFile&v=2

Whereas market concentration by definition refers to a specific product or geographical market, concentration ratios can also be used to determine the level of liquidity or concentration in a market or sub-market, or at a particular trading hub. Since real-time or near-real-time trading is playing a more central role as the injection of energy from fluctuating renewable energy sources increases, liquidity and concentration in these markets can be observed more closely. However, the analysis in this report is not preceded by comprehensive or conclusive market definition, as would be required when determining market power or market dominance. The results of the concentration analysis are merely intended to provide a broad overview and initial indication of liquidity and the depth of competition in the day-ahead, intraday and control reserve sub-markets. Owing to a lack of data on OTC trading, the examination of the day-ahead and intraday markets is restricted to exchange-based trading.

Day-ahead market

The EPEX and EXAA exchanges are the main locations for day-ahead trading in Austria. Liquidity and the concentration of trading on EPEX are the subject of numerous investigations and studies, including the Monitoring Report published by the German

EXAA CONCENTRATION RATIOS

	Purchases by traded volumes				Sales by traded volumes			
	HHI	CR3 Share (%)	CR4 Share (%)	CR5 Share (%)	HHI	CR3 Share (%)	CR4 Share (%)	CR5 Share (%)
Jan	472.04	25.88	32.04	38.04	589.69	32.50	37.05	41.19
Feb	1013.26	46.53	51.25	55.38	699.75	36.30	41.98	47.18
Mar	404.22	22.38	29.09	34.70	548.95	30.10	36.07	41.05
Apr	488.43	27.70	33.30	38.82	558.24	30.76	37.13	43.14
May	663.03	34.52	41.66	48.18	505.78	27.54	32.85	37.72
Jun	460.31	25.91	31.43	36.87	587.53	34.31	38.46	41.74
Jul	513.77	30.19	35.81	39.43	657.49	34.83	39.30	43.45
Aug	497.64	29.52	36.02	40.39	477.12	26.47	32.74	38.93
Sep	578.68	33.56	40.53	45.09	500.86	29.76	35.17	39.77
Oct	680.83	34.80	40.43	45.37	387.94	20.77	25.88	30.85
Nov	398.49	22.03	27.67	33.04	412.77	22.68	28.32	33.33
Dec	446.66	25.39	30.58	35.59	395.80	21.84	27.70	33.03

Table 7
EXAA concentration ratios

Source: E-Control market statistics

[8] See Federal Network Agency/Federal Cartel Office (2013), Monitoring Report 2013, p119, http://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/BNetzA/PressSection/ReportsPublications/2013/MonitoringReport2013.pdf?__blob=publicationFile&v=11

Federal Network Agency and the Federal Cartel Office[8], which looks at the concentration level of the entire day-ahead market.

The CR5 index, i.e. the five largest revenue-generating companies as a proportion of total revenue, for 2012 indicated a share of 39% on the buy side and 49% on the sell side. The aggregated CR5 index for the buy and sell sides was 42%. Although concentration on the buy side has been increasing since 2009 and has fallen on the sell side, it remained higher on the sell side in 2012. As described above, this may be attributable to a certain level of concentration in the electricity generating segment.

As part of E-Control's market statistics[9] and the EXAA Market Analysis[10], the CR and HHI ratios for purchases and sales on the EXAA exchange are published monthly. As Table 7 shows, in certain months the CR5 index is higher than the EPEX annual average, although the concentration levels on both exchanges are similar. The HHI fluctuates between just under 400 and around 1,000 during the year, but is generally below the 1,000 threshold, indicating a moderate level of concentration. The analysis also shows that market concentration is trending downwards over time.

Intraday market

EPEX introduced continuous exchange-based trading for the APG delivery zone in October 2012. This report includes the first ever calculations of the concentration and HHI ratio for this submarket. As EPEX intraday trading in the APG delivery zone has not been the subject of detailed investigations or study, the following analysis of concentration is broken down by hours in order to obtain the best possible overview of the various products offered for the APG zone.

The concentration ratio for the three companies with the highest revenue on the buy and sell sides – i.e. the CR3 ratio – was above 50% in every hour. However, in both categories the ratio is far higher in off-peak hours than in peak hours owing to the small number of market participants during off-peak hours. The picture is similarly pronounced in calculations of the HHI ratio. Chart 13 shows the HHI ratio for sales by traded volumes. As with the concentration ratio, the HHI suggests a higher degree of market concentration in off-peak hours. In both 2012 and 2013 the HHI was above 1,800 – the threshold value for a highly concentrated market – in the hours between 01:00 and 07:00. In 2012, the HHI was above the threshold for all products except for the 09:00 one. However, in 2013 concentration levels were modest for the remaining products. The HHI for purchases by traded volumes similarly shows high concentration during off-peak hours and moderate concentration during peak times of day. As in the previous analysis, the HHI was generally higher in 2012 than in 2013.

[9] http://www.e-control.at/de/statistik/strom/marktstatistik/stromboersen (German only)
[10] http://www.exaa.at/en/marketdata/market-analysis

HERFINDAHL-HIRSCHMAN INDEX (HHI) – SALES BY TRADED VOLUMES

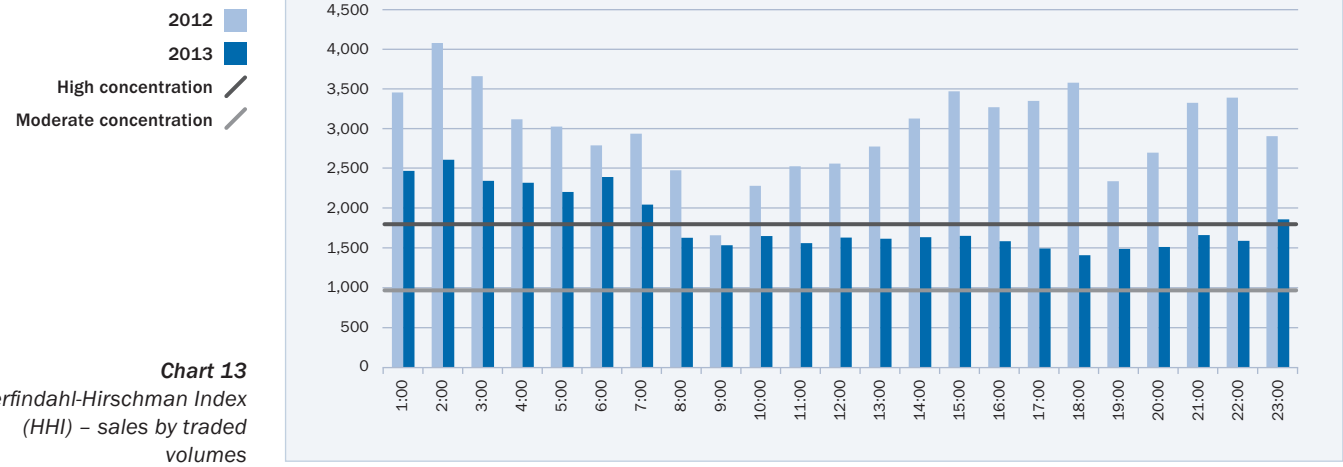


Chart 13
Herfindahl-Hirschman Index (HHI) – sales by traded volumes

Notes: Data for 2012 only available from 16 October 2012; data excl. weekends and public holidays; hourly basis

Sources: EPEX, E-Control calculations

One possible explanation for this is that intraday trading for the APG delivery zone was only introduced towards the end of 2012, meaning that the concentration indicators for that year refer solely to the period from October to December, when the process of establishing the market was only just under way.

Control reserve market

Owing to its unique structure, the control reserve market is not easily comparable with other markets. Demand is determined by the control area manager, which procures certain quantities of standby control capacity at auction. Only prequalified suppliers are allowed to participate in such auctions. Various products for each type of control energy – namely primary (PC), secondary (SC) and tertiary control (TC) – are offered for different flow directions (consumption or supply) and time intervals. The market is restricted to the Austrian control area, with the exception of primary control, where close links with the Swiss market have been in place since July 2013. Regarding product market segmentation, it would be safe to assume that the different PC, SC and TC products procured each form a separate product market. This is also the case owing to the contrasting technical requirements, and as a result the different potential

CR3 AND HHI FOR ALL CONTROL ENERGY TYPES			
	Primary control	Secondary control	Tertiary control
CR3	91 %	93 %	79 %
HHI	5,217	4,020	3,490

Source: E-Control

Table 8
Market concentration ratio (CR3) and Herfindahl-Hirschman Index (HHI) in the various control reserve markets (standby capacity only) based on revenue in 2012 and 2013

prequalified suppliers of the various types of control power.

A comprehensive and detailed analysis of all products shows that irrespective of the basis for calculation – such as prequalified capacity, revenue or offered quantities – and of the concentration indicator applied (CR, HHI, RSI or PSI), the basic conclusions derived from the results of analysis are the same.

In the interests of clarity, the following examination based on the findings of the comprehensive analysis only deals with representative figures for the three types of control energy, since the control energy market as a whole is highly concentrated, regardless of the type of control power or product. As measured by the HHI, concentration is highest in the primary control market and lowest in the market for failure and tertiary control capacity. Table 8 shows the revenue-based CR3 and HHI values for control capacity standby in the individual submarkets, with no differentiation between the various products. Such a revenue-based presentation is suitable as it includes quantity and price components, and also allows for comparisons with the day-ahead and intraday markets. The HHI for all three types of control capacity is well above the 1,800 threshold for concentrated markets, and the three largest companies have a combined share of over 90% of the PC and SC markets. Concentration is less pronounced in the TC market, but well above the generally accepted level for a highly competitive market.

Summary
An evaluation of published surveys of exchange-based day-ahead trading, as well as E-Control's own calculations for intraday trading and the control reserve market reveal a high degree of concentration in short-term electricity markets, with the exception of day-ahead auctions. It is noticeable that the closer a particular market segment is to the point of physical settlement, the higher the concentration ratio. This is due to the fact that the intraday/control reserve market, with the exception of primary control, is restricted geographically to the APG delivery area, and that the number of potential participants in these markets is limited owing to the complex technical requirements for generating stations associated with physical settlement. This is especially true of primary and secondary control capacity. However, the conditions for

participation in the control reserve market were recently revised, with the aim of allowing more sellers, including smaller companies, to enter the market.[11]

With regard to intraday trading on the EPEX exchange, it should be noted that in principle, Austrian market participants can indirectly take part in intraday trading in a German delivery area. OTC trading provides market participants with additional leeway. In contrast to day-ahead auctions, EPEX does not have a long track record when it comes to intraday trading. It can be assumed that as the share of erratic generating capacity and the need for short-term trading increase, the level of concentration in this market will drop significantly. On the control reserve markets, the effects of easier access for sellers and the extension of the market by means of partnerships with other control area managers for control reserve procurement are still unclear. However, the partnership with Switzerland has resulted in considerable price reductions on the primary reserve market.

KEY TOPIC 1: CAUSE-AND-EFFECT RELATIONSHIPS IN PHYSICAL ELECTRICITY TRADING

Short-term electricity trading is growing in importance as volatile renewable power accounts for an ever-increasing share of the generating mix. With this in mind, when preparing this year's market report E-Control carried out a detailed examination of this particular market segment, investigating the mechanisms that influenced short-term physical electricity trading in Austria in 2012 and 2013 as part of a study compiled in collaboration with Frontier Economics. The aim of the project was to obtain a more detailed and highly developed understanding of the drivers of price and volume fluctuations on the day-ahead, intraday and control reserve markets. Price and volume models were created for each of these three segments and potential interactions between them were identified on the basis of energy policy and econometric considerations. The methodology, data selection process and findings of the investigations are explained in detail in the following chapters.

Topic and methodology

The main focus of the survey was on identifying possible relationships between fundamental data or the evolution of prices on alternative markets, and changes in prices and volumes on the day-ahead, intraday and control reserve markets. Besides analysing the influence of drivers of fundamental data, a key objective was to discover the extent to which alternative marketing options could influence price and volume determination on the individual short-term markets.

The analysis was based on a single-stage error correction model (ECM)[12], which meets

[11] Information on ongoing and completed processes for the amendment of master agreements and prequalification conditions are available at http://www.apg.at/de/markt/netzregelung/konsultationen/konsultationsprozesse (German only)

[12] A model including only one dependent or independent variable, x, and using the regression equation $\Delta y_t = ß_0 + ß_1 y_{t-1} + ß_2 y_{t-1} + ß_3 \Delta x_t + e_t$, where the following definitions of coefficients also apply to the tables below: $ß_1$ measures the speed with which the model returns to equilibrium; $ß_3$ corresponds to the short-term influence of x on y; and $ß_2/ß_3$ corresponds to the long-term effect.

the requirements for an examination of fundamental data. Although risk analysts and traders generally apply financial-sector models and mathematical approaches, such as GARCH and Monte Carlo simulations, an ECM permits the direct interpretation of results in the form of interrelationships between external drivers and independent variables, in this case prices and volumes. From an econometric perspective, the advantage of the ECM is that it is applicable to both stationary and integrated time series, which helps to avoid difficulties arising from the application of ordinary least squares (OLS) estimators to integrated time series.

As with most econometric models, the main problem when using the ECM approach lies in evaluating and refining the model. In this regression analysis, where prices or volumes (both on the left-hand side of the regression equation) are to be explained in terms of a series of independent variables, there is a danger that an ad-hoc approach to selecting the dependent variables may produce an incomprehensible or random specification for the equation. Consequently, results generated solely using an arbitrary set of explanatory variables must be avoided as far as possible, as this would considerably distort the quantitative effects. This could give rise to possible relationships or bogus relationships which would not be generated by a different model, and could also lead to effects being underestimated or even overlooked, even though they form an important part of the real model. In this analysis, the possible drivers were filtered out from energy policy and theoretical considerations, and applied using the quality of the model as a decisive criterion.

The model's validity can be assessed using a variety of measures. It is generally assumed that in a suitable model the signs of the coefficients ($ß_0$, $ß_1$, etc.) are in line with the fundamental considerations, otherwise this would indicate the misspecification of the model, the omission of variables, or multicollinearity[13]. In addition, the error correction term ($ß_1$) in an ECM must lie between minus 1 and zero. The other criteria used were the determination coefficient, the adjusted R2 and the root mean square error (RSME), while the Akaike information criterion (AIC) and the Schwarz-Bayes criterion were adopted for the selection of the lag lengths[14]. Once the estimates had been made, post-estimation tests[15] of the model's statistical appropriateness were carried out, in particular with regard to the residuals e_t. A high priority was attached to the robustness of the model in order to ensure that a suitable model also focused on path independence and to guard against mechanistic selection in the treatment of statistically insignificant independent variables.

[13] A direct linear relationship between two or more dependent variables.
[14] Lags are observations from the preceding period made at a particular point in time (t), i.e. the value i for the terms t-i,i=1, etc. The AIC and Schwarz-Bayes criterion form the basis for determining the relevant number or value (i) for the model. These criteria provide a comparison of the model's complexity and its reliability, whereby the AIC and Schwarz-Bayes differ in terms of the calculation methods employed and the latter "penalises" model complexity more heavily.
[15] Econometric models are based on assumptions which must be satisfied in order to generate valid results. This is ascertained by means of post-estimation tests.

The final model meets the aforementioned criteria for validity and consequently only contains the explanatory variables with economically correct signs and statistically significant coefficients. Individual deviations from the final criteria are justifiable if they relate to a small sample or if the statistical quality of the model is impaired by the elimination of insignificant drivers. The criteria described above were also applied with regard to the types of function, such as log, semi-log and polynomial. In contrast, the base model is not a reduced model which must meet these criteria – initially it includes all of the drivers which could in theory be considered in the analysis.

As a result, the specific design of each individual model is geared towards the respective energy policy and econometric considerations, which may vary between the different submarkets. An alternative approach is particularly recommendable in relation to control reserve products, owing to differences in the geographical market area (Austria as opposed to Austria/Germany).

Data and descriptive statistics

Based on fundamental considerations regarding the merit order, electricity demand and the opportunity cost of control reserve products, a range of drivers was identified for each submarket. Hypotheses were also drawn up for each of the various potential alternative markets. A summary can be found in Table 9 below. Following the evaluation of the descriptive statistics, and taking econometric considerations into account, a shortlist of possible drivers for the individual submarkets was produced. This shortlist is discussed below.

Day-ahead market

As mentioned above, day-ahead trading of physical products for delivery to the Germany/Austria zone is possible on both the EPEX and the EXAA markets. Therefore, prices on either exchange, or a volume-weighted average price could be used in the analysis. As intraday trading is currently not an option on the EXAA exchange, the model estimates only include EPEX hourly prices, with a view to maximising consistency. This also has the advantage of permitting an assessment of the market that has higher trading volumes. Pearson correlation analysis of the price time series for both exchanges produced a value of 0.8966, confirming that an additional analysis of prices on EXAA would not provide further insights. For this reason, marketing options such as OTC trading were not examined.

The selection of fundamental data for the day-ahead market was based on the merit order, which determines the market-clearing equilibrium price for individual hourly products in the daily uniform price auctions (see Chart 14).

MARKETING OPTIONS IN AUSTRIA		
Submarket (dependent variable)	**Fundamental data**	**Data on alternative markets**
Day-ahead (EPEX prices/volumes)	(i) System load (ii) Wind power injection (iii) PV injection (iv) Primary energy prices (v) River levels/flows (vi) Storage levels (vii) Planned and unplanned supply interruptions at generating stations	(i) Price spreads vs. day-ahead markets in France, Switzerland and Czech Republic, and Nord Pool
Intraday (EPEX prices/volumes)	(i) Forecast deviations in wind power injection (day-ahead vs. intraday) (ii) Forecast deviations in PV injection (day-ahead vs. intraday) (iii) Forecast deviations in run-of-river generation (day-ahead vs. intraday) (iv) Forecast deviations in load (day-ahead vs. intraday) (v) Unplanned supply interruptions at generating stations (day-ahead vs. intraday)	(i) Price spreads vs. intraday markets in France and Czech Republic, and Nord Pool (ii) Price spreads vs. day-ahead markets in Germany/Austria, France, Switzerland, Czech Republic and on Nord Pool (iii) Balancing energy prices in preceding period (iv) EXAA day-ahead prices (absolute value)
Primary control (PC) (capacity prices and excess supply)	(i) River levels/flows (ii) Planned and unplanned supply interruptions at prequalified generating stations	(i) Phelix baseload weekly futures prices (ii) Phelix peakload weekly futures prices (iii) Market maker's tertiary control prices in preceding week
Secondary control (SC) (capacity and energy prices, and excess supply)	(i) River levels/flows (ii) Storage levels (iii) Planned and unplanned supply interruptions at prequalified generating stations	(i) Phelix baseload weekly futures prices (ii) Phelix peakload weekly futures prices (iii) Primary control prices in preceding week (iv) Market maker's tertiary control prices in preceding week (v) Day-ahead prices in Austria/Germany (EPEX and EXAA), France, Switzerland and Czech Republic, and on Nord Pool
Tertiary control (TC) (capacity and energy prices, and excess supply)	(i) River levels/flows (ii) Storage levels (iii) Planned and unplanned supply interruptions at prequalified generating stations	(i) Phelix baseload weekly futures prices (ii) Phelix peakload weekly futures prices (iii) Primary control prices in preceding week (iv) Day-ahead prices in Austria/Germany (EPEX and EXAA), France, Switzerland and Czech Republic, and on Nord Pool (v) Intraday prices in preceding period

Source: E-Control

Table 9
Marketing options for short-term physical electricity trading in Austria, and potential drivers of prices and volumes (longlist)

PRICING DURING UNIFORM PRICE AUCTIONS

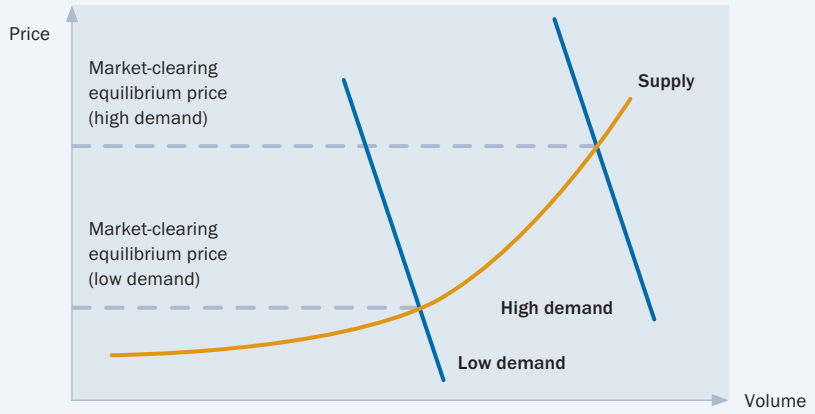


Chart 14
Pricing during uniform price auctions

Source: E-Control

EPEX DAY-AHEAD PRICE AND LOAD

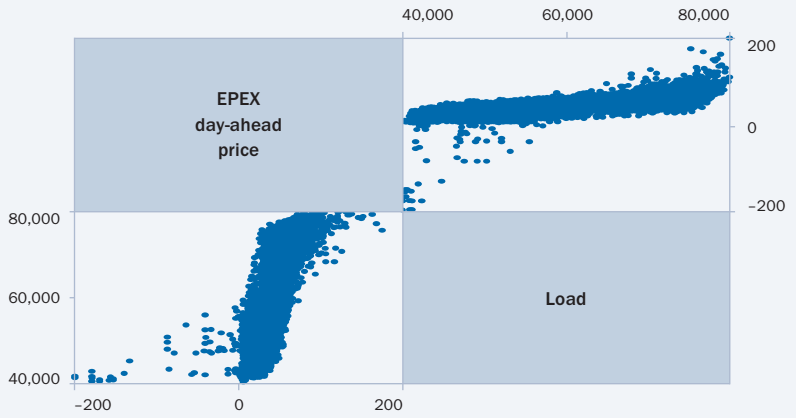


Chart 15
EPEX day-ahead price and load

Source: Frontier Economics

On the demand side, load can be expected to have a positive influence on prices, as the combination of constant supply and rising demand will cause the point of intersection of the two curves to shift to the right. However, it should be noted that this effect might not be linear, as the merit order is steeper at peak load times, and a small increase in consumption can lead to larger price changes than at off-peak times.

Scatterplots show that this is particularly true of load in the data set used for the analysis (see Chart 15).

As far as supply is concerned, wind power and PV injection have a marginal cost of zero, which results in a shift in the merit order to the right and keeps prices down. The impact depends on the steepness of the merit order at a particular time. In peak hours where consumption is high, PV and wind power injection should have a greater influence on prices. In addition, the effect of PV is highly seasonal, with only 6-7% of total injection occurring between December and February. Also, PV's influence on price is restricted to certain hours with available sunlight, i.e. around the middle of the day. The direct application of PV injection as an independent variable would underestimate its impact, since the periods in which its impact is low would reduce the overall effect.

DESCRIPTIVE STATISTICS

Variable	Observed values	Mean	Std. deviation	Minimum	Maximum
EPEX price (h)	4,386	43	16	–100	134
Load	4,386	67,547	8,784	42,232	84,286
Wind power injection	4,386	5,749	4,991	135	26,084
PV injection	4,386	9,259	5,751	144	23,952
Residual load (load less wind power and PV injection)	4,386	52,538	11,887	18,049	78,859
Rhine – flow	4,386	161	243	44	2,848
Danube – flow	4,386	391	196	147	1,955
Planned supply interruptions	4,386	13,942	6,297	1,423	26,831
Unplanned supply interruptions	4,386	2,277	1,105	212	7,593

Source: Energate, ENTSO-E and TSOs, www.eeg-kwk.net, German Federal Institute of Hydrology (BfG) and EEX transparency platform

Table 10
Descriptive statistics for potential drivers used in analysis of the day-ahead market for the hours between 11:00 and 16:00

An alternative approach involves observing residual load, which is calculated by subtracting wind power and PV injection from the total load. Table 10 shows an evaluation of the most common descriptive statistics in the sample for the day-ahead market in the hours between 11:00 and 16:00.

Primary energy prices, especially for gas and coal, and the prices for CO_2 emission allowances could in theory influence prices because they have an impact on costs for fossil-fuel-fired marginal generating stations in the merit order. However, the correlation matrix reveals that there is only a minor linear relationship on an hourly basis. The Pearson coefficient ranges from 0.036 for natural gas in the NCG market area to 0.17 for CIF ARA hard coal prices – significantly lower than the level that may be assumed for a linear relationship. Aggregating the time series on a daily or even a weekly basis considerably increases this correlation. No further observations on primary energy prices are provided, as the aim of this analysis is to explain hourly price determination.

Econometric factors should also be considered when analysing alternative day-ahead markets. On the whole, it can be assumed that neighbouring markets such as those in Italy, Switzerland and France have an influence on price formation on the EPEX exchange, provided market access is technically possible and permitted under the applicable market rules. But in contrast to alternatives such as the intraday market, the timing of trading activities does not determine the direction of influence; in other words, the day-ahead market influences the intraday market, but not vice versa. Regarding prices on neighbouring day-ahead markets, it is by no means clear which price is decisive, for example whether Nord Pool prices influence those on EPEX or vice versa, so the direction of influence is unclear. This contradicts the core econometric assumption of the exogeneity of all independent variables and may distort the analysis of price drivers. In addition, the strong correlation between prices on the European day-ahead markets gives rise to a multicollinearity problem, meaning that the equation cannot be identified or the evaluation is at the very least distorted. Finally, there is also the risk of a spurious regression, i.e. a relationship is identified where none exists when prices respond to the same underlying driver (e.g. oil prices). For this reason, alternative neighbouring markets are not covered by the analysis of the day-ahead market.

Intraday market

The considerations for the intraday market are similar to those for day-ahead trading. However, the initial complication lies in the selection of the dependent variables, as the EPEX runs separate order books for trading in hourly and quarter-hourly products. The delivery zone for which an order is placed is also important due to the different closing times for trading in products for delivery to Germany and Austria.

Intraday trading for delivery to the Austrian zone is still in its infancy and market liquidity is low, so focusing on German intraday prices is a more sensible approach.[16] Since only a small number of the possible drivers of prices and volumes are available with quarter-hourly granularity concentrating on hourly products would appear to be a more effective way of achieving the objective of the analysis. Due to the large number of data points, an evaluation of hourly trading figures poses no problems in terms of the robustness of the estimate. In the following analysis, the EPEX intraday prices and volumes always relate to hourly products for delivery to Germany. As this is a highly liquid market which is widely used by Austrian electricity traders, it is also the most important point of reference for intraday trading in Austria.

When identifying potential drivers it is important to consider that the intraday market is "downstream" of the day-ahead market as far as timing is concerned, since events after the gate closure time for the day-ahead market, and in particular after schedule submission at 14:30 d-1, may necessitate further trading by market participants. Such events include unexpected power plant outages, new forecasts for wind power and PV injection, and new results for the quarter-hourly load forecast. We can therefore assume that on the intraday market, it is not absolute forecast amounts or traders' expectations that are decisive, but the deviations from the forecasts or expectations that had influenced the prices offered on the day-ahead market. Consequently, forecast errors – the differences between forecast and actual values – can be identified as possible drivers. With regard to wind power and PV, a positive error means that the market participants are holding short positions, which should be reflected in additional demand on the intraday market.

In contrast to the examination of the day-ahead market, where the econometric analysis does not include alternative marketing options in neighbouring markets, when considering the intraday market the day-ahead market is included in the evaluation as an alternative. This is due to the strict chronology of the two markets and the obvious causality that can be expected as a result. Table 11 illustrates that – as expected – there is a very strong correlation of 0.88 between intraday and day-ahead prices. A linear analysis shows rather weak correlation with other drivers, although the signs correspond to of the expected direction of the relationship. The strongest correlation is with the residual load error, which is inversely related to the intraday price.

Control reserve markets

The examination of the control reserve market presents a number of econometric difficulties. With the exception of primary control (PC), bids are being invited for several products, and both a capacity charge and a unit rate are offered. As a result, there are significant numbers of potential dependent variables and dependent regression equations.

[16] Until October 2012 EPEX products for delivery to Germany represented the only opportunity for Austrian market participants to engage in exchange-based intraday trading. As a result, and due to the comparatively high liquidity level compared to other intraday markets, the German delivery zone remains an important benchmark for Austrian intraday prices.

CORRELATION MATRIX: POTENTIAL DRIVERS OF THE EPEX INTRADAY PRICE

	EPEX intraday price	EPEX Day-ahead price	Wind power forecast error	PV forecast error	Load forecast error	Residual load error	Unplanned supply interruptions
EPEX intraday price	1						
EPEX day-ahead price	0.8804	1					
Wind power forecast error	0.3284	0.2069	1				
PV forecast error	0.1769	0.0354	0.0269	1			
Load forecast error	–0.3538	–0.3709	0.0198	–0.0500	1		
Residual load error	–0.4817	–0.4116	–0.3641	–0.3341	0.8809	1	
Unplanned supply interruptions	0.1672	0.1538	0.0846	–0.0318	–0.0400	–0.0577	1

Table 11
Correlation matrix: potential drivers of the EPEX intraday price

Source: EPEX, TSOs, Energate, www.eeg-kwk.net, EEX transparency platform

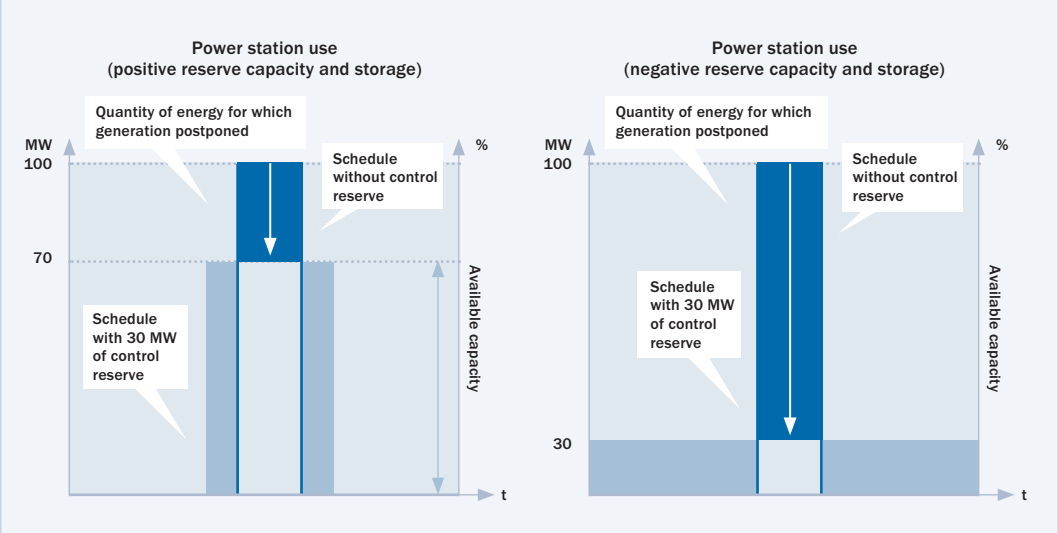
This does not cause any problems in terms of the calculations, but it does adversely affect the clarity of the results, which is why either the aggregation of products or a focus on individual products is necessary. In this particular case, aggregating products is problematic because it requires bundling peak and off-peak, or positive or negative secondary and tertiary control products, as there may be significant differences in the available power plants and the resulting merit order functions, depending on the time interval and flow direction. As a result, a meaningful interpretation of the results is all but impossible, so this option was rejected.

However, the aggregation of secondary control products was possible owing to the close correlation between prices at the one-week and four-week auctions. This means that there are six secondary control products to analyse instead of the original 12. With regard to tertiary control, it was not possible to meaningfully aggregate the 24 different products, so it was decided to concentrate on two representative products.

The consideration of possible independent variables on the control reserve market is based on theoretical cost determination models.

The opportunity cost can be used to analyse capacity prices, as it accurately reflects sellers' short-term considerations. The method takes into account the costs associated with alternative marketing channels, such as having to generate in periods when wholesale prices are suboptimal, the decision not to generate electricity, generation in periods when costs are not covered, and suboptimal electricity procurement. The opportunity costs for hydropower plants include the costs of deferring production, since selling on alternative markets such as the day-ahead market is not possible at the optimal time, as well as the costs of water which is not used when no generation takes place. Technical costs could also be incurred, for instance efficiency losses when a plant operates below full load or costs arising from minimum load conditions. Chart 16 illustrates these factors using the example of a storage power station for positive and negative standby capacity. Maintaining 30 MW of positive standby capacity out of a total capacity of 100 MW would result in a shift in the time of generation, since 30 MW must be kept available for the provision of control energy. In order to maintain negative standby capacity, power plant output must be maintained at 30 MW or above. If the overall quantity of energy remains unchanged, the economic efficiency of the plant is suboptimal over time.[17]

EXAMPLE: STORAGE POWER STATION USE REQUIRED TO MAINTAIN NEGATIVE AND POSITIVE CONTROL RESERVE



Source: Frontier Economics

Chart 16
Example: storage power station use required to maintain negative and positive control reserve

[17] Assuming that in terms of alternative marketing options the schedule without control reserve represents optimum power plant operation over time.

These considerations give rise to a series of hypotheses for the regression model used to estimate capacity prices. It can be expected that the prices for maintaining negative standby capacity will exceed those for positive capacity, since the former results in must-run costs. The effect of prices on alternative markets also differs depending on whether power is injected or withdrawn. Maintaining negative capacity when day-ahead prices are low is more expensive as the must-run costs are high in such cases. The opposite is true with maintenance of positive capacity, because the opportunity costs of lost revenue rise when day-ahead prices are high. It can be assumed that excess supply, flow rate and power plant availability in general will have a negative impact on capacity prices. In contrast, the model for energy prices is based on those for the day-ahead and the intraday markets. When interpreting the results, it should be noted that power station operators can use the energy price to manage the probability of call-offs from their plants. It is difficult to illustrate this effect using an econometric time series model.

One potential problem with modelling capacity prices is the repeated occurrence of price peaks. Chart 17 presents the changes in the prices of various products, converted into euros per MWh. The chart shows that there was a rise in prices for primary and secondary control capacity in mid-2012, but price peaks were generally observed towards the end of each year. From a modelling perspective, the key question is whether these peaks should be expressed as an endogenous part of the model using fundamental data, and

CAPACITY PRICES IN THE AUSTRIAN CONTROL RESERVE MARKET, EUR/MWh

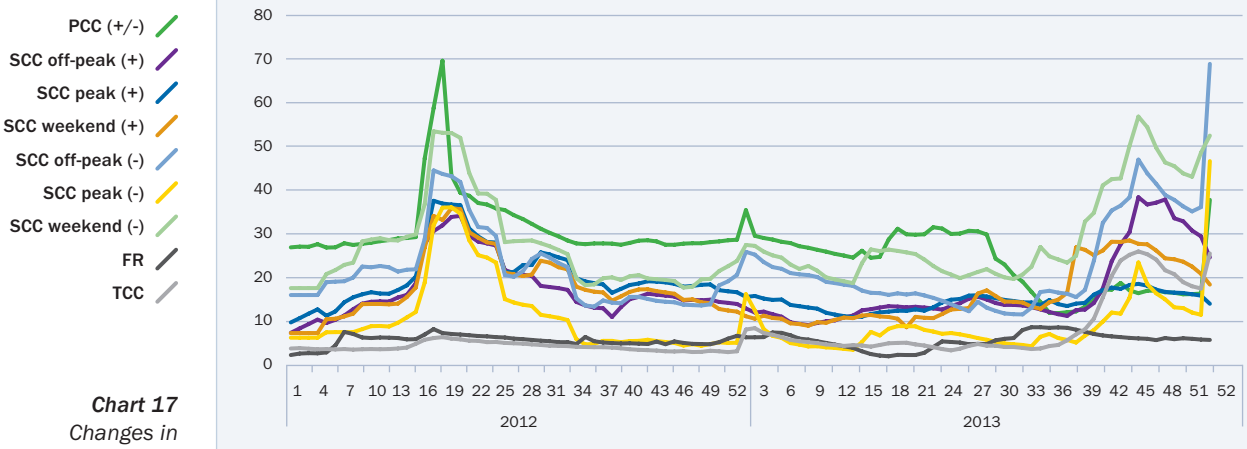


Chart 17
Changes in capacity prices

Source: APG and own calculations

whether they should be modelled, or whether they should be classified as outliers and removed from the model.

Owing to their distorting effect, it is usually advisable to eliminate outliers from econometric analyses using a clearly defined method, such as Cook's distance. However, since one of the aims of the analysis is to explain price changes over time, including any price rises, only the price outliers that would significantly influence the results were removed from the econometric section. This represents a restrictive application of Cook's distance. In order to ensure that the price peaks caused by outliers are not neglected in the analysis, each of these extreme price situations can be subjected to a separate examination.

Observation period

The choice of observation period is just as decisive as the data collection process. Although a longer observation period normally enhances the robustness and quality of the results, it should be noted that depicting structural shifts in econometric models by means of dummy variables can be problematic. In addition, the results of a model based on observations from the more distant past may be less relevant to the present situation. The changes in generating capacity in recent years mean that price determination is probably significantly different to that before 2010. PV and wind power injection have also gained considerably in importance over the same period.

The analysis was therefore limited to 2012 and 2013 in order to produce results which accurately reflect current market developments. As hourly products are traded on the day-ahead and intraday markets, there should be sufficient observations available for the analysis. However, this is not the case with the control reserve markets, where weekly auctions take place, so it would be advisable to use a longer time horizon in order to increase the number of available observations[18]. On the other hand, auctions for all products were only introduced in their current form in 2012. As a result, it is not possible to choose a longer time horizon and in turn a larger data sample.

Day-ahead market: findings

Two different approaches were chosen for the analysis of day-ahead prices on the EPEX exchange. In summer especially, the peaks in the daily load curve usually correspond to those in daily PV injection. If an undifferentiated analysis of an entire day was carried out, due to overlapping effects it would not be possible to clearly interpret the coefficients, meaning that the coefficient for PV injection would be underestimated because part of the actual effect would be included in the calculation of the load coefficient. This problem is illustrated in Chart 18. The use of residual load in the base model was identified as a possible solution. This methodology allows for the creation of a robust base model.

[18] Total of 104 in 2012 and 2013

Non-linearities are shown using polynomial terms for residual load, which is also the most important driver in the model. For example, with a total residual load of 40 GW, an increase in residual load of 1 GW pushes up EPEX prices by EUR 1.42/MWh. In the case of a maximum residual load of 80 GW, the same increase would result in a price rise of EUR 5.02/MWh. However, in this base model it is not possible to determine whether the effect is the result of an additional gigawatt of load or a 1 GW drop in wind power or PV injection, since the residual load reflects both effects equally. In contrast, the flow of the Rhine is only statistically significant in certain circumstances[19], while that of the Danube as well as unplanned supply interruptions are statistically insignificant from zero.

A major part of the study focused on the influence of weather-dependent renewable energy sources. Therefore, the time series in the final model were decomposed in order to directly deduce the influence of load, wind power and PV. The data set was split into separate time series for summer and winter, with a particular focus on the sun's peak hours, i.e. the hours between 11:00 and 16:00. However, as the error correction model includes variables with lags, the splitting of the data set results in jump discontinuities which must be picked up using dummy variables.[20] This strategy is depicted in Chart 19. For instance, the dummy hour variable represents the jump from 16:00 on a particular day to 11:00 the following day.

PEAKS IN PHOTOVOLTAIC INJECTION AND LOAD

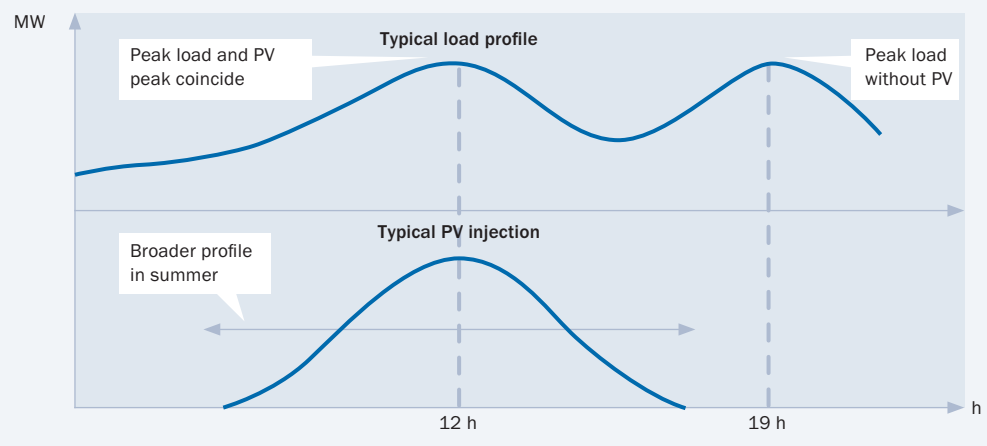


Chart 18
Peaks in photovoltaic injection and load

Source: Frontier Economics

[19] P-value of 0.068
[20] Dummy variables can only have a value between zero and 1

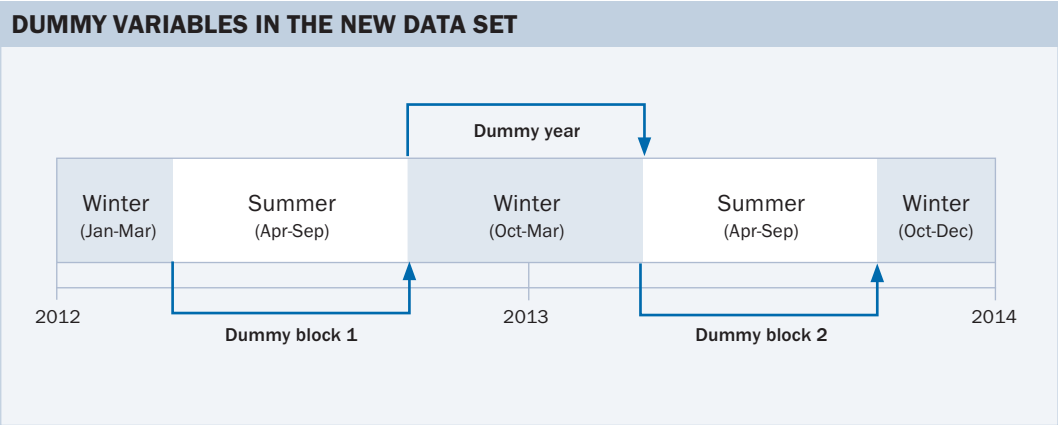


Chart 19
Dummy variables in the new data set

Source: Frontier Economics

This separation of the data set is applied in the final model. Polynomial terms were not used, in order to avoid multicollinearity problems and to allow for simpler interpretation of the coefficients. Transformation by means of logarithms was likewise rejected in order to remove the complexity associated with the treatment of negative prices, while post-estimation tests show that the normality of residuals in a log model cannot be guaranteed. On the whole, the models for hourly intervals are preferable to the base model because of their higher explanatory power (adjusted R-squared and RMSE), and the post-estimation tests also produce better results[21]. Table 12 shows the results for the final day-ahead model for summer.

Generally speaking, the adjusted R-squared and the F-test show that the selected model adequately describes the data set and can explain over 70% of the price fluctuations. By comparison, the figure for the entire time series in the base model was around 50%. The signs of the independent variables highlight the expected direction of influence, so load has a positive impact on prices, while wind power and PV have a negative impact. PV has comparatively a stronger influence in winter, since it can be assumed that photovoltaic injection will be lower during this period. The difference between the coefficients for load and wind power injection is not statistically significant.

As a result, it can be deduced that during the observation period, an additional 1 GW of wind power injection led to a drop of EUR 1.3/MWh (winter: EUR 1.2/MWh) in the EPEX day-ahead price, while an additional 1 GW

[21] In the interests of readability, the results of the post-estimation tests are not presented in detail. All of the final models were thoroughly tested in terms of the normal distribution of the residuals, autocorrelation, heteroscedasticity, multicollinearity and convergence (ECM), and they satisfy the fundamental assumptions. All models were also assessed using the robust Newey-West estimator.

of PV injection resulted in a decline of EUR 1.2/MWh (winter: EUR 1.4/MWh).

This confirms the expectation that in principle, with regard to a shift in the merit order, it makes no difference whether the additional injection of power is attributable to wind power or PV, as the marginal costs of both technologies are negligible and are in any case on the far left-hand side of the merit order curve. The contrasting effects of PV injection in summer and winter may be explained by the fact that high PV injection levels in summer result in a declining marginal effect. The reduced load in summertime could also be the reason why the effect of PV during this period is less pronounced. One possible explanation for this is the flat merit order curve when load is low, resulting in the small marginal effect of PV injection. As expected, a

RESULTS OF THE FINAL MODEL FOR THE DAY-AHEAD MARKET (SUMMER)	
Quality of model	
No. of observations	2,195
F (11, 2183)	552
Prob > F	0.0000
R-squared	0.7357
Adj. R-squared	0.7344
RMSE	4.4730

Day-ahead market – final model: summer						
d1_EPEX price	Coefficient	Std. error	t-value	P>t	95% conf. interval	
l1_EPEX price	–0.2034	0.0129	–15.7700	0.0000	–0.2287	–0.1781
l1_Load	0.0003	0.0000	12.9700	0.0000	0.0002	0.0003
d1_Load	0.0014	0.0000	52.0300	0.0000	0.0013	0.0014
l1_Wind	–0.0003	0.0000	–9.1800	0.0000	–0.0004	–0.0002
d1_Wind	–0.0013	0.0001	–21.1100	0.0000	–0.0014	–0.0011
l1_PV	–0.0003	0.0000	–8.9000	0.0000	–0.0003	–0.0002
d1_PV	–0.0012	0.0001	–19.5100	0.0000	–0.0013	–0.0011
l1_Dummy hour	4.5787	0.4731	9.6800	0.0000	3.6509	5.5066
d1_Dummy hour	3.2294	0.3057	10.5600	0.0000	2.6298	3.8290
l1_Dummy year	0.9258	0.2029	4.5600	0.0000	0.5280	1.3236
d1_Dummy year	14.6310	4.4896	3.2600	0.0010	5.8268	23.4353
Constant	–5.6184	0.9617	–5.8400	0.0000	–7.5043	–3.7326

Table 12
Results of the final model for the day-ahead market (summer)

Note: d1=first differential, l1=first lag

Source: Frontier Economics

1 GW rise in load produces a day-ahead price increase of about EUR 1.4/MWh (winter: EUR 1/MWh). In this case, the flatter merit order curve in summer also leads to a reduced marginal effect, and a Z-test shows that the difference between summer and winter is not statistically significant.

Supply interruptions and flow do not have a statistically significant influence and consequently are not included in the final model.

The price in the hour beginning at 11:00 stood out in the analysis. In spite of adjusting for all of the other effects included in the model, such as wind power, PV and load, the price was between EUR 3.2/MWh and EUR 4.4/MWh higher than in all of the other sun's peak hours. This raises the question as to what other factor influencing this particular hour could have such a large systemic impact. One potential explanation is the cost of firing up peak load power plants which could manifest this first peak hour.

The approach adopted in the trading-volume model was identical to that for EPEX day-ahead prices. Here, plausible signs and values for the most important drivers – load, wind power and PV – appear in the evaluation. A 1 MW increase in load gives rise to a 0.1 MWh upturn in trading volumes and a 1 MW increase in PV injection leads to a jump in trading volumes of 0.6 MWh. Considering that alternative trading hubs exist besides EPEX, including online brokerages and the bilateral OTC market, this is a substantial effect. However, the negative coefficients for supply interruptions reduce the overall plausibility of the model. In the case of the model for trading volumes, it is therefore questionable whether there is a specification for the regression which depicts the true underlying model effectively.

Intraday market: findings

Four base models were also assessed as part of the joint study with Frontier Economics. As with the day-ahead market, three variants for hourly prices in the Austrian and German delivery zones were examined: a full-year observation and individual regressions for summer and winter. The fourth base model focused on hourly average purchasing and sales volumes in the Austrian and German delivery zones[22]. In the specification for the full-year model which includes the residual load error as opposed to separate forecast errors for wind power and PV, the signs of the coefficients are plausible and the explanatory power is good, with an adjusted R-squared of 0.579. Consequently, a EUR 1/MWh rise in the day-ahead price pushes up the intraday price by EUR 0.78/MWh, and the residual load error and its polynomial terms are likewise statistically significant. A forecast error of 1 GW in addition to a residual load error of 3 GW would result in a price increase of around EUR 11/MWh[23].

The results of the winter model (for the period from October to March) can be found in Table 13. The explanatory power of the model is very good, with an adjusted R-squared of 0.639, and the results are extremely robust.

[22] The aggregated prices and trading volumes for the Austrian and German intraday market published by EPEX were used in the analysis.
[23] Due to the non-linear specification of the regression equation, the marginal influence depends on the residual load error. This means it can only be expressed with a specific value for the residual load error, e.g. 3 GW.

A change in the dummies used in the estimating equation or the application of the robust Newey-West estimator produces the same results, and the signs of the coefficients are as expected. The intraday price goes up by EUR 0.83/MWh in response to a day-ahead price rise of EUR 1/MWh.

RESULTS OF THE FINAL MODEL FOR THE INTRADAY MARKET (WINTER)	
Quality of model	
No. of observations	2,189
F (7, 17535)	259
Prob > F	0.000
R-squared	0.641
Adj R-squared	0.639
Root MSE	5.602

Intraday market – final model: winter						
d1_EPEX intraday price	Coefficient	Std. error	T	P>t	95% conf. interval	
l1_EPEX intraday price	–0.2289	0.0135	–16.92	0.000	–0.2554	–0.2024
l1_EPEX price	0.2153	0.0160	13.48	0.000	0.1840	0.2466
d1_EPEX price	0.8327	0.0185	44.94	0.000	0.7964	0.8690
l1_Wind power forecast error	0.0006	0.0001	5.64	0.000	0.0004	0.0008
d1_Wind power forecast error	0.0025	0.0002	15.02	0.000	0.0022	0.0028
l1_PV forecast error	0.0009	0.0001	9.76	0.000	0.0007	0.0011
d1_PV forecast error	0.0022	0.0002	12.56	0.000	0.0019	0.0026
l1_Unplanned supply interruptions	0.0004	0.0001	3.69	0.000	0.0002	0.0007
d1_Unplanned supply interruptions	0.0015	0.0003	4.83	0.000	0.0009	0.0021
l1_Dummy hour	1.3969	0.5316	2.63	0.009	0.3545	2.4393
d1_Dummy hour	1.3298	0.3542	3.75	0.000	0.6351	2.0244
l1_Dummy block 1	–0.6113	0.3538	–1.73	0.084	–1.3050	0.0825
d1_Dummy block 1	–0.8116	8.0924	–0.10	0.920	–16.6814	15.0581
l1_Dummy block 2	–0.8216	0.3073	–2.67	0.008	–1.4242	–0.2191
d1_Dummy block 2	4.2261	5.6702	0.75	0.456	–6.8934	15.3456
Constant	0.0960	0.4811	0,20	0.842	–0.8474	1.0395

Table 13
Results of the final model for the intraday market (winter)

Note: d1=first differential, l1=first lag

Source: Frontier Economics

If the wind power forecast error increases by 1 GW, the resulting higher demand leads to a price rise of EUR 2.5/MWh, while in the case of photovoltaic, an identical change in the forecast error pushes up the price by EUR 2.2/MWh. As expected, the difference between a 1 GW forecast error for wind or PV is not statistically significant, since from the trader's point of view it makes no difference whether the forecast error stems from wind or photovoltaic power. A 1 GW rise in unplanned supply interruptions is reflected in a EUR 1.5/MWh jump in the intraday price.

The two seasonal models differ in that the wind power forecast error has a stronger influence in winter[24] and the load forecast error is statistically significant during summer. However, the effect of an addition of 1 GW to the forecast is relatively small – the price rises by only EUR 0.3/MWh. However, this may be attributable to the data set, as only two TSOs publish load forecasts for Germany.[25]

In contrast, the explanatory power of the full-year intraday volume-based model is low, with only 8% of the fluctuations in volumes explained by the model. In addition, the mean error (RMSE) of 436 MW is very high in comparison with the average quantity bought and sold of 1,500 MW. The negative signs of the coefficients for the wind power and PV forecast error also do not accurately show the direction of the relationship, as a higher forecast error should lead to an increase in demand and in turn to a rise in intraday prices. The insufficient data set poses a potential problem when it comes to estimating trading volumes. This is compounded by the fact that only two of the four German transmission system operators publish their load forecasts. On the other hand, the error forecasts for wind power and PV are incorporated in the model in the shape of the day-ahead forecast[26]. As the intraday market saw continuous trading in 2012 and 2013, the information available at the time of submission of bids is important in relation to the quantities recorded in the order book. As a result of this time shift, the available forecast errors do not fully reflect the deviations which are significant for electricity traders.

Control reserve market: findings

With the exception of primary control, the analysis of control reserve products did not generate a satisfactory model. As mentioned in the description of the methodology, outliers were removed so as not to distort the explanatory power of the fundamental drivers. Excess supply in the tenders for primary control and the introduction of the partnership with Switzerland in July 2013 were identified as the main drivers of primary control prices.

The PCC partnership – i.e. the GCC[27] dummy – led to a significant price reduction of around EUR 6/MWh. Storage levels and the excess supply (the offered quantity minus the tendered quantity) are both statistically significant at around 5%, and the signs are as expected.

[24] Z-test
[25] This would mainly pose a problem in an econometric analysis if the forecast errors of the two TSOs which do not publish forecasts differed systematically from those of the other two TSOs.
[26] The forecasts are published on the EEX transparency platform at 18:00 on the preceding day (d-1).
[27] Grid Control Cooperation

PRIMARY CONTROL – FINAL MODEL	
Quality of model	
No. of observations	93
F (7, 17535)	11
Prob > F	0.000
R-squared	0.539
Adj R-squared	0.489
Root MSE	1.056

Primary control – final model						
d1_PCC price	Coefficient	Std. error	T	P>t	95% conf. interval	
l1_PCC price	–0.3298	0.0491	–6.7200	0.0000	–0.4274	–0.2322
l1_Phelix baseload	0.0728	0.0256	2.8400	0.0060	0.0219	0.1238
d1_Phelix baseload	–0.0249	0.0284	–0.8800	0.3830	–0.0815	0.0316
l1_Excess supply	–0.0798	0.0155	–5.1400	0.0000	–0.1107	–0.0490
d1_Excess supply	–0.0364	0.0171	–2.1300	0.0360	–0.0705	–0.0024
l1_Storage levels	–5.34E-07	1.95E-07	–2.7400	0.0070	0.0000	0.0000
d1_Storage levels	0.00000344	0.00000145	2.3700	0.0200	0.0000	0.0000
l1_Dummy GCC	–3.3909	0.6592	–5.1400	0.0000	–4.7021	–2.0798
d1_Dummy GCC	–5.8201	1.0994	–5.2900	0.0000	–8.0067	–3.6335
Constant	9.6823	1.8136	5.3400	0.0000	6.0752	13.2894

Table 14
Primary control – final model

Note: d1=first differential, l1=first lag

Source: Frontier Economics

However, Phelix baseload weekly futures prices are not statistically significant. Further reduction of the model results in poorer post-estimation tests and lower explanatory power. In this case, the adjusted R-squared falls to below 0.4. Econometric analyses of the offered quantities and capacity prices for the other control reserve products do not produce any robust models with sufficient explanatory power. The R-squared is again well below 40%, coupled with plausible signs for the fundamental price drivers.

This may be attributable to the small sample of a total of 104 data points including outliers, and to the complex and dynamic cost

relationships and pricing mechanisms. In addition, it may be the case that parameters which presumably should be included in the model, such as continued market power and market concentration, cannot be depicted over time, and therefore must be excluded from the analysis. This is all the more unfortunate because particularly in relation to PCC, market expansion and the resulting competitive pressures have significant empirical effects.

Summary

The analysis shows that interactions between prices, trading volumes and fundamentals are clearly identifiable, especially on the EPEX day-ahead market. During 2012 and 2013, load and injections of wind and PV power had a significant impact on wholesale electricity prices. These factors also influenced trading volumes, although it should be noted that the plausibility of the volume-based model is called into question by the unexpected negative impact of the non-availability of generating stations. With regard to intraday trading on EPEX, the day-ahead price, wind power and PV forecast errors and unplanned supply interruptions are the primary factors influencing price. During the period under observation, the load forecast error was not a significant driver of prices. This may be due to the fact that only two of the four German TSOs published their load forecasts during the period, and these were used as a reference value for the forecasts for all four transmission system operators. A systematic deviation in the load forecast error of the two TSOs that did not publish their forecasts could have resulted in the misinterpretation of the influence of this particular factor. The explanatory power of the volume-based model for the intraday market is low, with only 8% of the fluctuations in volumes explained by the model. This may be attributable to the data set. The unpublished load forecasts of the two TSOs also represent a problem in the volume-based model, and the low explanatory power could be explained by the fact that the forecast deviations for wind power, PV and load are based on forecasts published on the previous day, and do not reflect the current knowledge of market participants at the time of trading. With the exception of primary control, the examination of the control reserve markets in 2012 and 2013 does not provide any meaningful explanations of price trends brought about by the fundamental drivers. As far as primary control is concerned, the excess supply of control capacity and the recently initiated process of integration with the Swiss market are the primary causes of the decline in price. The latter is also a clear indication that future efforts should mainly be directed towards the rapid integration of the various, primarily national control reserve markets.

COMPETITION ON THE RETAIL MARKET

The electricity retail market can broadly be broken down into two segments:

1. **Mass market:** households, small and medium-sized enterprises (SMEs), farms and other small consumers with an annual electricity demand of less than 100,000 kWh. Standard load profiles are assigned to these consumers. The suppliers are legally obliged to publish their prices for this consumer segment.

2. **Individual contract consumer market:** SMEs, large-scale industrial enterprises and service businesses with an annual consumption of over 100,000 kWh and metered load profiles. These consumers have individually negotiated supply agreements.

Retail market structure

Supply side

There were hardly any changes in the structure of the mass market in 2013. Two new suppliers, PGNiG Sales&Trading (PST) and WEB Windenergie AG, entered the market at the end of the year, while Stadtwerke Klagenfurt unveiled its new Pullstrom brand in early June 2014. The new entrants were provided with copies of E-Control's guidelines for market entry, which were drawn up in 2013.

The range of products on offer grew by more than a third compared with the previous year.[28] Households in Vienna, Lower Austria and Burgenland now have a choice of up to 44 products (mid-2013: approx. 35), including six to eight from local players. Household consumers in Styria have the widest selection of alternative products – a total of 42 from 26 different suppliers – but customers in Vorarlberg can only choose from 33 products (see Chart 20).

Demand side

In 2013 electricity was supplied to 5.965m metering points in Austria – a year-on-year increase of 0.64%. This was mainly due to the large number of new household customer connections. Households account for around 72% of all metering points, but only about 24% of electricity consumption.

Concentration in the Austrian electricity market[29]

The market shares for suppliers of non-load metered customers have been included in the market statistics since 2008.[30]

The data show that the market shares and HH index (HHI)[31] scores of the three largest suppliers are above the threshold values in some segments, indicating a highly concentrated market.[32] Concentration in the household and SME consumer segments in 2013 was 1,781 (2012: 1,769) and 1,684 (2012: 1,685) respectively – below the HHI threshold of 1,800.

[28] See E-Control tariff calculator, www.e-control.at, status: 12 June 2014

[29] The data relate to non-load metered small consumers. As there is no information on the shares of the load profile metered consumer market, it is not possible to calculate the concentration for this segment.

[30] The legal basis for this is the Ordinance of the Federal Ministry of Economics and Labour on Statistical Studies relating to the Electricity Industry (*Elektrizitäts-Statistikverordnung 2007* [Electricity Statistics Ordinance 2007]), FLG II No. 284/2007.

[31] Herfindahl-Hirschman Index (HHI): the aggregate squared market shares of all firms. An indicator of concentration and competitive intensity.

[32] 50% for CR3 and 66.7% for CR5; 1,800 for the HHI

CHOICE OF PRODUCTS (HOUSEHOLDS, 3,500 KWH/Y)

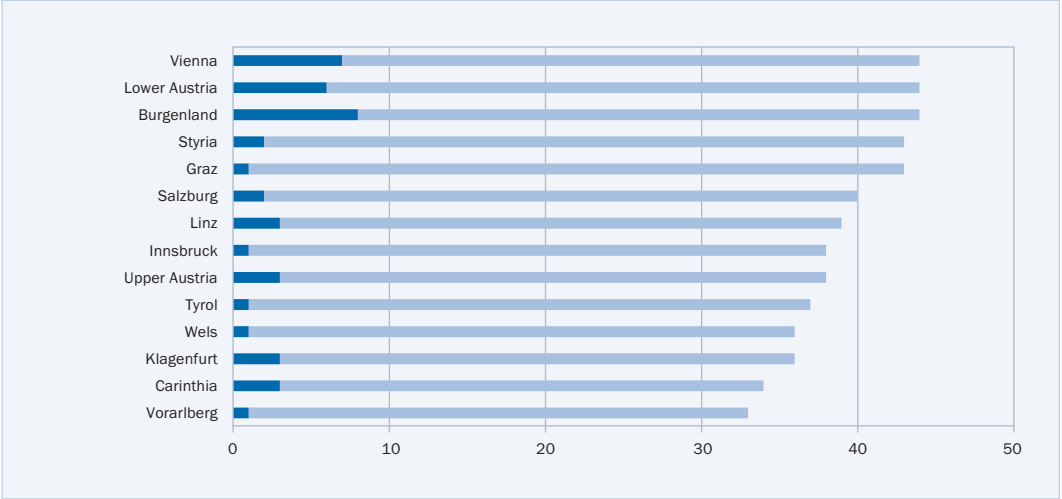


Chart 20
Choice of products for households

Source: E-Control tariff calculator (status as of June 2014)

CONCENTRATION IN THE AUSTRIAN SMALL CONSUMER ELECTRICITY MARKET, %

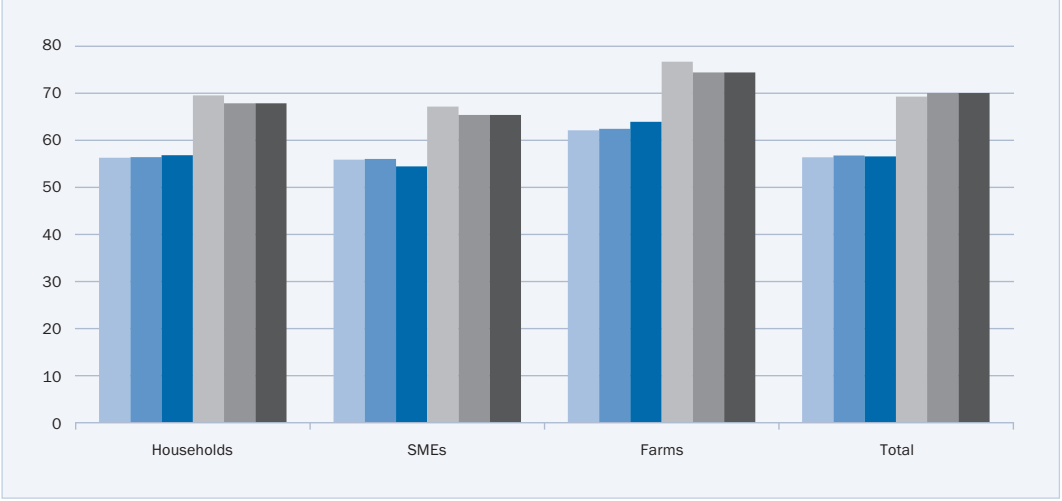


Chart 21
Concentration in the Austrian small consumer electricity market

Source: Market statistics and E-Control calculations

The cumulative market share of the three largest suppliers of household consumers remained virtually unchanged at 57%, and that of the three largest suppliers of SMEs also held steady at 55%, compared with 56% for both groups in 2012.

The market share of the five largest suppliers to households fell slightly from 70% to 68%, while the five largest suppliers to SMEs also saw a slight drop in their market share, from 68% to 65%. In other words, over two-thirds of all demand is still met by the five largest suppliers.

There was a slight shift in individual companies' market shares in the year under review. The local players still exercise strong market power, but alternative suppliers have been gaining shares by making attractive offers aimed at customers throughout the country.

Suppliers' product policies

Product differentiation in the household consumer segment is based on the following features:

> Form of communication (e.g. online): in order to sign up for online products, customers must have internet access and an e-mail address. Payment by SEPA direct debit is often required. The number of online products has been rising steadily since 2012.

> Energy mix (e.g. green power products): products drawn from renewable sources such as hydro, wind or solar, or differentiated on the basis of characteristics such as ecolabelling.

> Pricing scheme: a distinction can be made between products without price guarantees where the price can change at any time, products where prices are guaranteed for between 12 and 24 months, and floating prices with or without caps which are adjusted monthly or quarterly.

> Billing: suppliers offer integrated billing in their home markets, e.g. customers receive a single bill for their energy costs and system charges. Separate invoices are generally issued to customers outside the home market, as is the case with the majority of alternative suppliers.

Most of the tariffs on offer are standardised. However, many suppliers are now marketing alternative products which are frequently far cheaper than the standard ones. The proportion of such products is increasing almost monthly. In Vienna, 20% of the available products have price guarantees, 7% are "floaters" with automatic price adjustment, and the remainder are conventional products without price guarantees. Almost 30% of all products are online, 70% include integrated billing and 60% are green power products.

Consumer awareness of the issue of energy costs rose significantly during 2013/14, which was also reflected in the sharp increase in the use of the tariff calculator. Energy costs in the mass market remain high and have long been decoupled from wholesale prices, which are falling. This issue has been the subject of increasing media coverage. New suppliers have taken advantage of this situation to break into the market. Meanwhile, alternative local suppliers used the opportunity to launch marketing campaigns in collaboration with other sectors. Alternative suppliers changed

their new-customer discounts more frequently in response to competitors' offers.

Early in 2013 and again in autumn last year, oekostrom AG brought a renewable energy product onto the market in cooperation with supermarket chain Hofer. AEE Naturstrom launched a similar campaign together with coffee retailer Tchibo. These offers were limited to 5,000 supply agreements, and included longer-term price guarantees and green power certification, as well as recommendations from environmental organisations such as Greenpeace and Global 2000. The Austrian Consumers Association's Energiekosten-Stop campaign also added new momentum to the market, prompting the highest switching rates seen since market liberalisation.

VKI Energiekosten-Stop campaign

The Austrian Consumers Association VKI started Austria's first ever pooled gas and electricity procurement programme on 26 September 2013. VKI joined forces with Netherlands firm PrizeWize, which had already implemented such an initiative in its home country, as well as in Belgium, Portugal and the United Kingdom. Three campaigns launched by the Dutch consumer protection agency in 2012 attracted 295,000 consumers, of whom around 115,000 switched energy supplier. Similar programmes resulted in 46,000 supplier switches in Belgium, 47,600 in Portugal and 37,000 in the UK. PrizeWize received an agreed fee from the energy supplier for each supply agreement concluded and VKI had its costs reimbursed. The association held talks with 14 prospective energy suppliers prior to the campaign and organised a best-bidder procedure[33] on 17 December. The bids submitted by stromdiskont for electricity and goldgas for gas supply were accepted.

By 16 December 260,584 consumers had registered online for the non-binding campaign.

Starting in mid-January 2014, these consumers received a calculation of the potential savings based on their annual consumption, and had time until the end of February to decide whether they wanted to switch to the new tariff. All that was required to set the switch in motion was the completion of an online form and VKI took care of the remaining steps. By the end of the campaign 98,000 households had switched energy supplier, of which 68,000 had changed their electricity provider. The campaign closed on 11 April 2014.[34]

Switching behaviour

The switching rate almost doubled year on year in 2013, from 1.1% to 1.9% of all supply contracts. Last year 114,235 electricity customers switched to a new supplier, including 78,083 households, surpassing the record set in 2010. In the first half of 2014, 157,856 electricity customers (metering points) changed supplier, or 2.6% of the total. This figure included 125,555 households (2.9%), 30,868 other small consumers (1.9%) and 1,433 industrial consumers (3.9%). Vienna recorded the largest number of transfers, at 47,845, followed by Upper Austria with 41,660, Styria with 29,011 and Lower Austria with 23,505.

[33] APA reports on VKI Energiekosten-Stop campaign, 13 Sep 2013
[34] VKI press release, 6 May 2014

SUPPLIER SWITCHES (metering points)

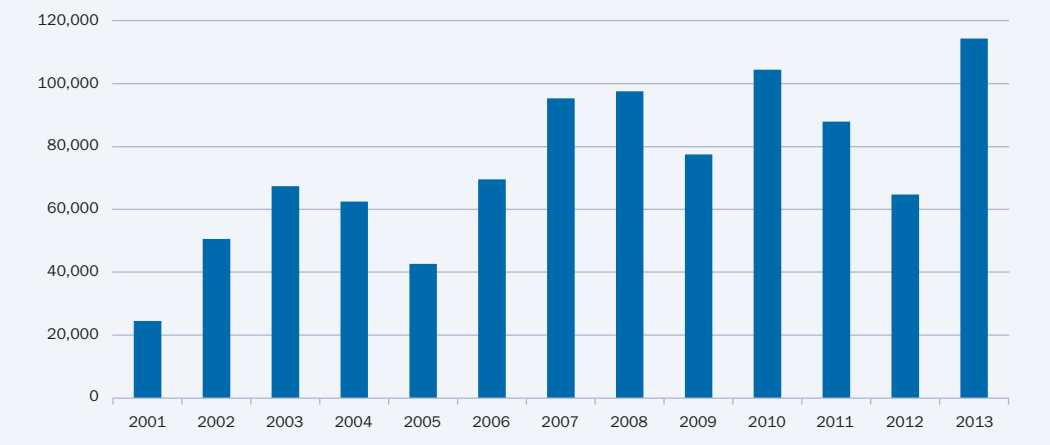


Chart 22
Supplier switches, 2001-2013

Source: E-Control

SUPPLIER SWITCHES AND SWITCHING RATES (metering points)

Chart 23
Supplier switches and switching rates, 2010-Q2 2014

Source: E-Control

The highest switching rate (i.e. willingness to switch supplier) was registered in Upper Austria (4.2%), followed by Vienna (3.2%), Styria (3.1%) and Lower Austria (2.8%). The sharpest increase was among small consumers, in particular households – more of these customers changed supplier in the first half of 2014 than in 2012 and 2013 combined. The number of transfers among other small consumers in the first six months of 2014 was close to that for the whole of 2013. A total of 68,000 electricity supply agreements were concluded under the VKI campaign.

Potential savings from switching

The savings on offer as a result of switching from the regional incumbent to an alternative supplier have doubled since 2011. Households in the Upper Austria and Linz grid zones lead the way, with savings of up to EUR 190/year, compared with a low of EUR 70/year for households in Vorarlberg (see Chart 24).

Retail price trends

Mass market

In early September 2013 Verbund, the largest alternative supplier, cut its energy prices for both new and existing customers by an average of 10%. The EnergieAllianz companies responded with reductions of around 3.4%-3.8% at the start of October, and in early 2014 Salzburg AG lowered its prices by some 5%. A number of smaller local players (such as Karlstrom, Stadtwerke Bruck an der Mur and Stadtwerke Mürzzuschlag) followed suit, decreasing their prices in the first half of 2014. As a consequence Austrian households saved a total of around EUR 37.8m between September 2013 and May 2014.

POTENTIAL SAVINGS IN ELECTRICITY COSTS, EUR/year (households, 3,500 kWh/y)

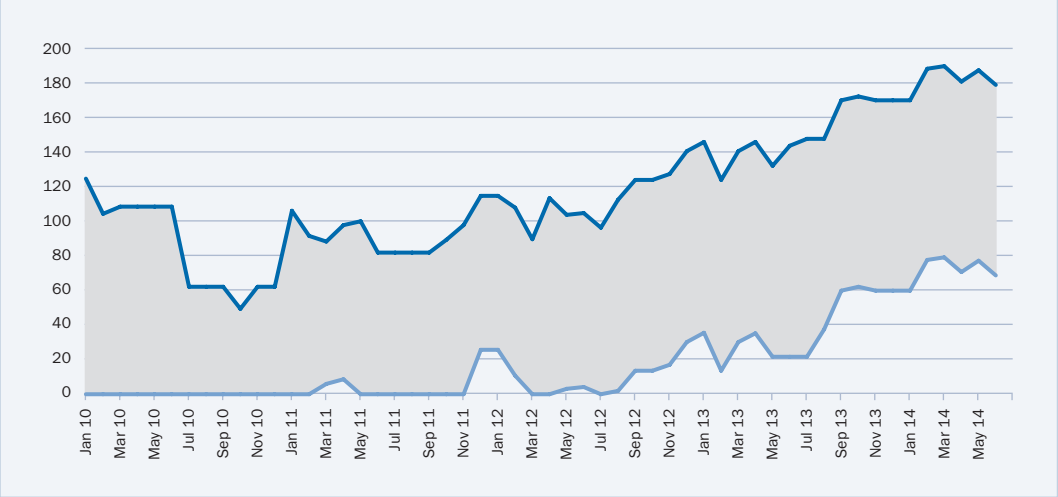


Chart 24
Potential savings (energy costs incl. VAT) for a typical household (3,500 kWh/y) switching from the incumbent to the cheapest supplier

Source: E-Control tariff calculator

CHANGES IN ELECTRICITY COSTS, BY COMPONENTS*, 2013-2014

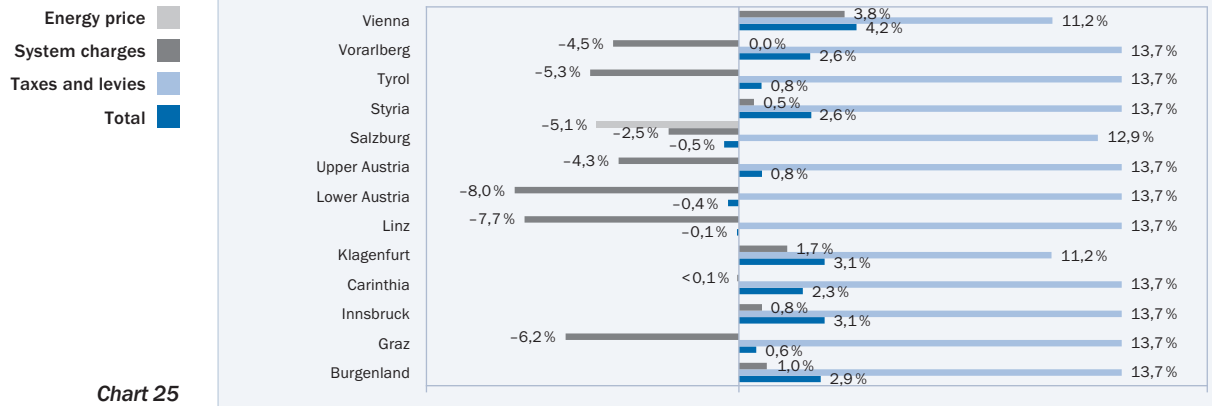


Chart 25
Changes in electricity costs, by components, 2013-14

** Typical household, consumption of 3,500 kWh/y; energy price of incumbent supplier excl. discounts; system charges incl. grid utilisation charge, charge for grid losses and metering charge; change in taxes and levies excl. VAT*

Source: E-Control

The grid utilisation charges were amended at the beginning of 2014, resulting in rises or falls depending on the grid zone in question. Household consumers in Vienna saw the highest increase, of 3.8%, while the biggest drop in household prices came in Lower Austria.

The cost of renewable electricity (renewables contributions) jumped sharply in 2014, with a typical household with consumption of 3,500 kWh/year paying EUR 68 as opposed to the previous level of EUR 54 excluding VAT, a 26% increase. Not including the potential savings from supplier transfers, households in Vienna were hardest hit, with a price rise of EUR 26 in early 2014, while consumers in Salzburg saw a EUR 4 reduction in their bills (see Chart 25).

SMEs

E-Control extended its price comparison services for consumers at the end of 2013. In addition to households, SMEs and large industrial customers – which can use the tariff calculator, the SME energy price check or published industrial price comparisons when selecting their electricity or gas supplier – small businesses with standardised load profiles can now take advantage of a new online application, the SME tariff calculator. Initial analyses show that the lowest electricity prices (including new customer discounts)

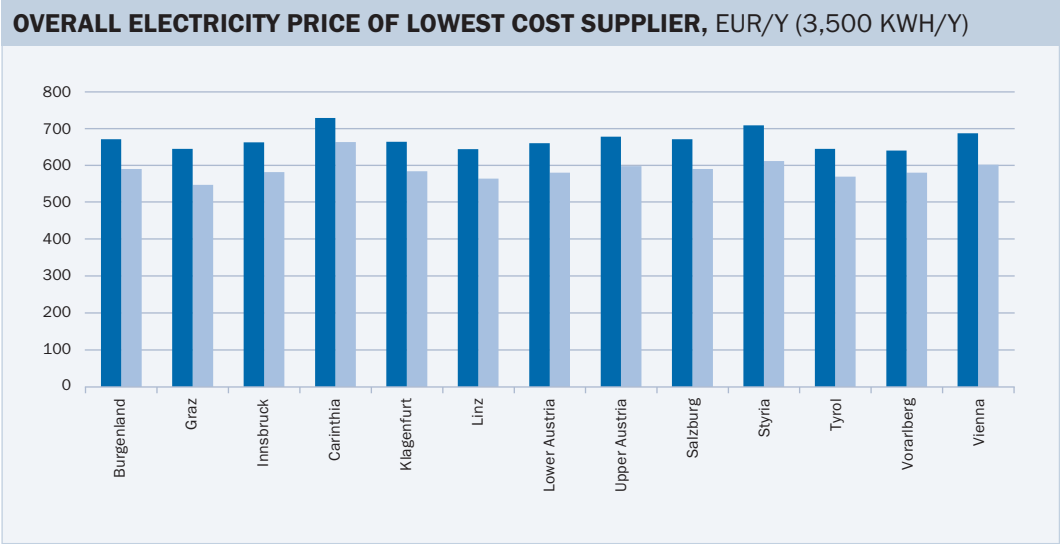


Chart 26
Overall electricity price of lowest cost supplier, by grid zone (typical household/ typical SME load profile, Grid Level 0, 3,500kWh/y, energy and system charges incl. taxes and levies)

Source: E-Control tariff calculator (status as of February 2014)

for SMEs are 10%-15% higher than those for households. Local suppliers' products for SMEs are up to 5% more expensive than those for households. In contrast, gas prices for both consumer groups are almost identical.

Most suppliers charge the same basic flat rate for households and SMEs for the same service portfolio. Depending on annual consumption, this amounts to between 1% and 15% of the total net energy price. The difference between household and SME prices is mainly attributable to the unit rate, which is significantly higher for SMEs supplied by certain providers. The tariff calculator provides small and medium-sized enterprises with 10-15 offers for electricity and between four and 12 for gas. By contrast, household consumers can choose from between 25 and 37 offers for electricity and between five and 19 for gas. SMEs in Graz have the widest choice and businesses in Tyrol and Vorarlberg the lowest.[35]

Price trends in comparison with the rest of Europe

Trends in household prices including all taxes differed sharply across Europe. In the second half of 2013, prices fell year on year by 18% in Hungary and 6% in Poland, but rose by 9.6% in France and by 9.2% in Germany. In Austria there was a minimal reduction from 20.24 cents/kWh to 20.18 cents/kWh. Average prices in the EU-28 countries rose by 2.8% from 19.54 cents/kWh to 20.09 cents/kWh (Chart 28). The share of unregulated component of total costs (i.e. energy) in Vienna dropped from 41% to 37% between the end of 2012 and mid-2014.

[35] E-Control tariff calculator, status: February 2014 (see Charts 26 and 27)

OVERALL ELECTRICITY PRICES OF LOCAL PLAYERS, EUR/Y (3,500 KWH/Y)

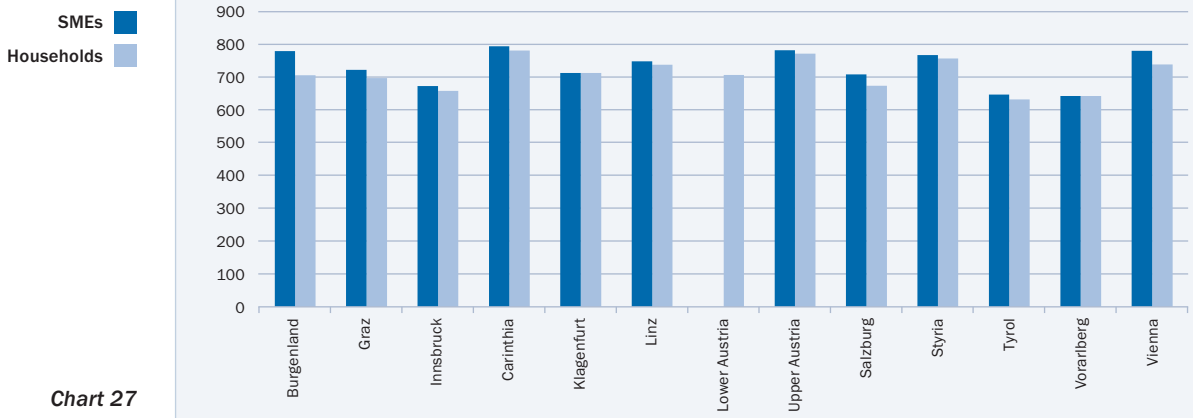


Chart 27
Overall electricity prices of local players

Source: E-Control tariff calculator (status: February 2014)

The highest proportions were recorded in Athens (63%) and London and Dublin (58%), and the lowest in Copenhagen (15%), where taxes and levies make up 56% of the total price. In Vienna, energy accounts for 37% of the overall cost – well above the average of 28% (see Chart 29).

Individual contract consumers

The industrial price survey[36] identified a slight increase in prices in the second half of 2013 compared to the first half. However, prices fell by 4% year on year. The average price for all categories was below 6 cents/kWh. Consumers with annual demand of more than 10 GWh and over 4,500 full load hours paid the lowest prices, as illustrated in Chart 30.

In summer 2013 E-Control carried out its fifth survey of businesses with annual energy consumption of over 2 GWh. Increased competition among suppliers was seen as a positive factor, but the respondents felt that it still fell short of the required level. The survey found that market prices for electricity are seen as fairer than in previous years.

Austrian industrial electricity prices (energy and network charges, excluding taxes and levies) were below the European average (Chart 31). Electricity is cheaper in France, the Netherlands and Sweden, but considerably more expensive in Denmark, Germany, Italy, Spain and the UK.

[36] Since the second half of 2003 E-Control has surveyed the energy prices paid by Austrian industrial consumers directly, on a biannual basis (January and July), using an online form. The results are posted on our website (www.e-control.at).

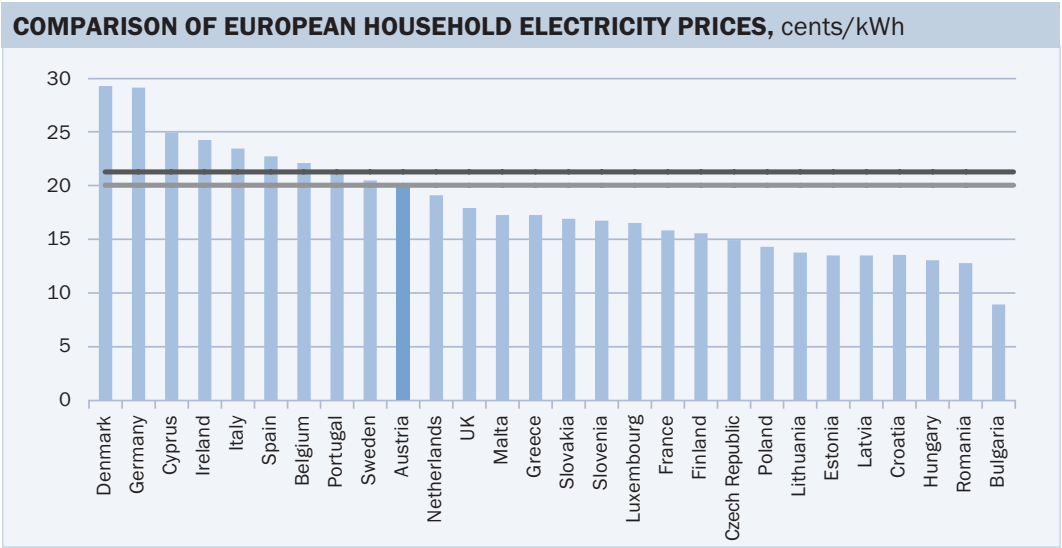


Chart 28
Comparison of European household electricity prices (energy and system charges, taxes and levies), consumer band DC 2,500-5,000 kWh, H2 2013

Source: Eurostat, status as at 15 September 2014

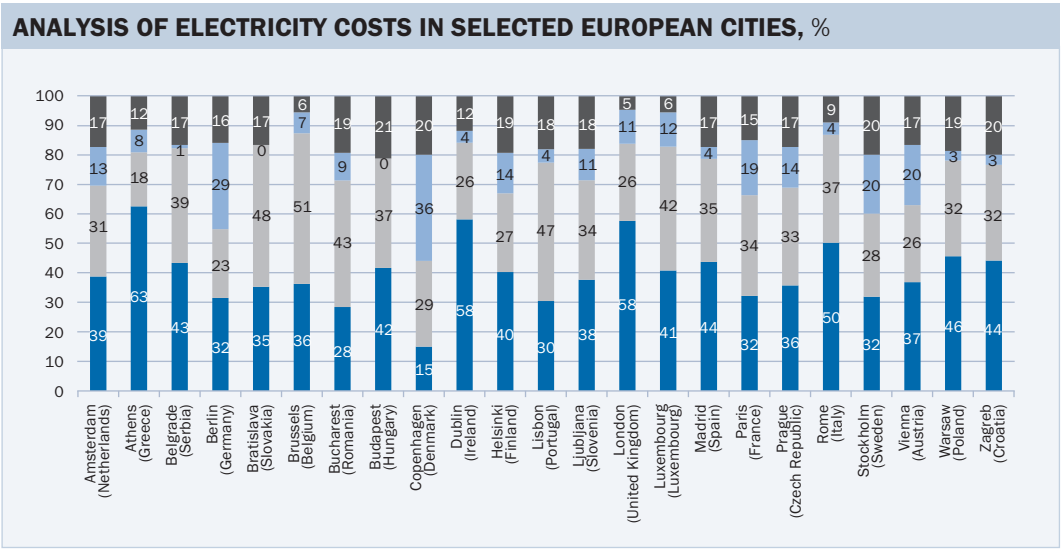


Chart 29
Analysis of electricity costs in selected European cities

Source: HEPI[37] May 2014, E-Control

[37] The European Household Energy Price Index (HEPI) is compiled by E-Control in cooperation with the Hungarian regulator MEKH and VaasaETT. This weighted index tracks price trends throughout Europe. It is calculated on the basis of the electricity and gas prices of the incumbents and their leading competitors in the various capital cities. The analysis takes the tariffs most widely used by consumers in each city.

INDUSTRIAL ELECTRICITY PRICES, OVER TIME, cents/kWh

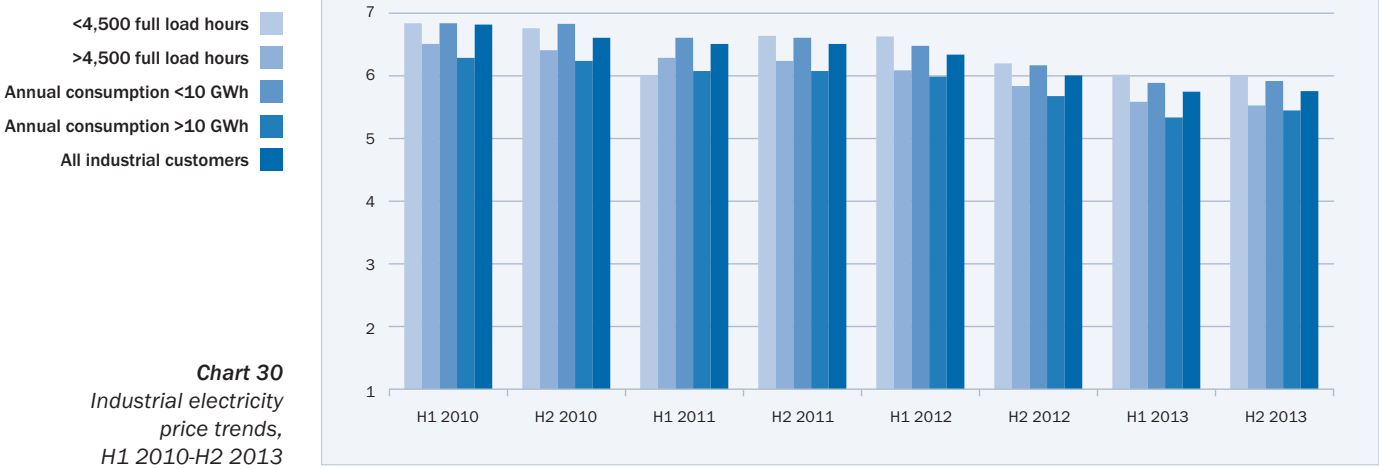


Chart 30
Industrial electricity price trends, H1 2010-H2 2013

Source: E-Control

COMPARISON OF EUROPEAN INDUSTRIAL ELECTRICITY PRICES, cents/kWh

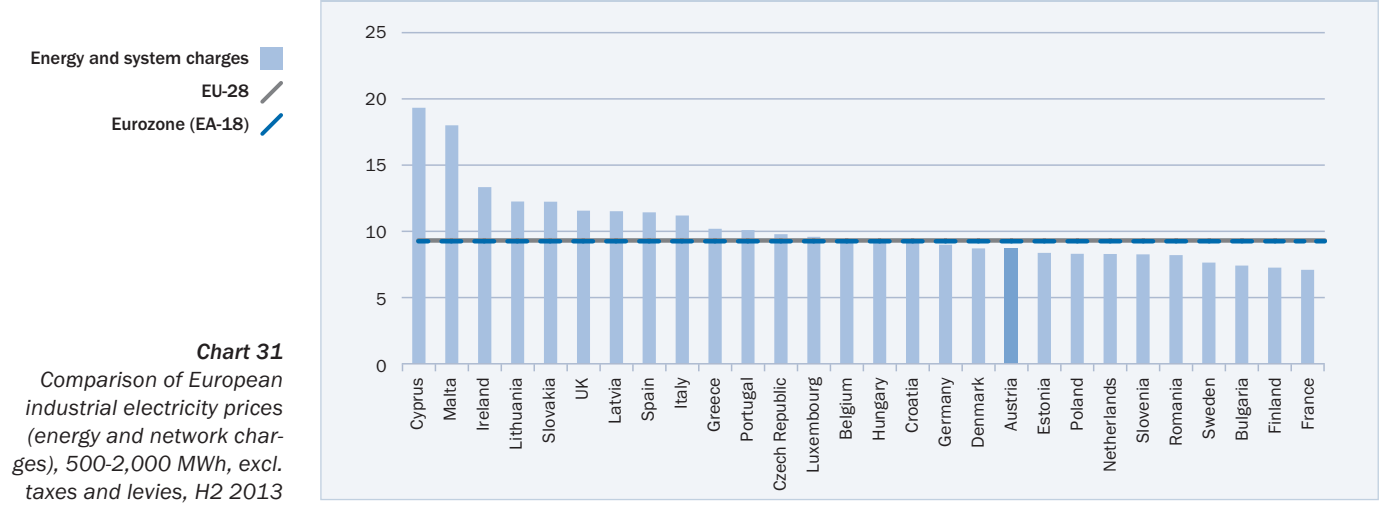


Chart 31
Comparison of European industrial electricity prices (energy and network charges), 500-2,000 MWh, excl. taxes and levies, H2 2013

Source: Eurostat, status: 13 June 2014

INVESTIGATIONS AND MEASURES AIMED AT PROMOTING EFFECTIVE COMPETITION

In light of consumer electricity price trends between 2008 and 2012, and the changes in wholesale prices in the same period, E-Control initiated a market investigation pursuant to section 21(2) *Energie-Control-Gesetz* (E-Control Act) in conjunction with section 34 E-Control Act and section 10 Electricity Act 2010. At the end of November 2013, a representative sample of suppliers were requested to provide E-Control with the necessary data on the revenue and cost structures of their electricity retailing operations broken down by product and customer groups. We had first requested the completion and return of questionnaires as part of a market investigation at the end of August 2011. Following clarification of the legal situation by the constitutional court and administrative court of appeal, a new survey was carried out in 2013, but this lasted until 2014 owing to an application for extension of the deadline for submitting the information. As well as examining revenue and cost structures, the investigation was primarily geared towards analysing the assumptions underlying E-Control's margin calculations.

Security of supply: electricity

CHANGES IN SUPPLY AND DEMAND

During the reporting period E-Control used the latest version of its detailed empirical demand model, the Model of Electricity Demand in Austria (MEDA), to monitor supply security. MEDA can generate detailed forecasts of electricity demand trends based on external parameters such as economic and income growth, inflation and global warming.

With the input parameters and underlying assumptions chosen, the MEDA demand model yields final energy consumption of 66,612 GWh in 2020 – equivalent to an average annual increase in electricity consumption of 1.1%. This is lower than last year's forecast, which put the average annual increase at about 1.5% up to 2020. This was mainly a reflection of the slowdown in demand growth in the past six years (except in 2010) which was included in the model.

Electricity generation is influenced by a variety of factors. For instance, the amount of precipitation and water supply have an impact on storage levels at pumped storage power stations. Forecasts also need to take account of available generating capacity, which is lower than installed capacity due to factors such as maintenance turnarounds, shutdowns, faults, storage levels and water flow.

As part of the implementation of section 20i(1) Energy Intervention Powers Act 1982 as

amended by FLG I No. 106/2006, this year's market report includes a survey of power station development projects planned up to 2025. The additional generating capacity currently planned, subject to approval or under construction at the end of June 2013 is shown in Chart 32.

In order to obtain a more realistic estimate of guaranteed capacity, a simulation model was used for the first time in 2012. A detailed description can be found in the appendix to last year's market report. Greater forecasting accuracy is aimed at taking into account the structural changes in generating capacity.

As required by the Energy Intervention Powers Act, the survey focuses on hydro and thermal power stations. This is because renewable generation projects (such as wind, biomass and PV) are heavily dependent on support mechanisms and, as past experience has shown, such plants can be built and commissioned relatively quickly. Any projections must also take into consideration the *Ökostromgesetz* (Green Electricity (Amendment) Act 2011), which targets a combined increase of 2,200 MW in wind, biomass and biogas capacity between 2010 and 2020. Given the current legal position, the probability of these projects

GENERATING CAPACITY IN 2025, MW

Chart 32
Forecast generating capacity in Austria in 2025[38]

Source: E-Control

[38] Incl. statistical differences arising from estimates for power plants with maximum capacity of less than 1 MW which cannot be classified as a particular type of plant.

being implemented is assumed to be 100%. New capacity due for commissioning by 2025 (excluding renewables) amounts to some 4,785 MW, of which hydropower stations account for 2,981 MW and thermal power stations for 1,804 MW. The forecasts include generating stations with capacities of less than 25 MW, provided these were reported. Reported closures are also considered in Chart 32.

Econometric estimates of annual peak load can be generated using the MEDA electricity demand forecast. The change in peak load, which is predicted to grow by an average of 114 MW per year between 2013 and 2020, and the maximum capacity of the available power stations is shown in Chart 33 below. Scenario 1 is the more conservative prediction and includes plants which are under construction and will be connected to the grid, while Scenario 2 also takes account of projects that have been submitted for approval. It is assumed that all renewable generating projects will be implemented on account of the current legal framework.

In light of the expected peak capacity of available power stations and the forecast peak loads up to 2020, no supply shortages

AUSTRIAN CAPACITY COVERAGE, MW

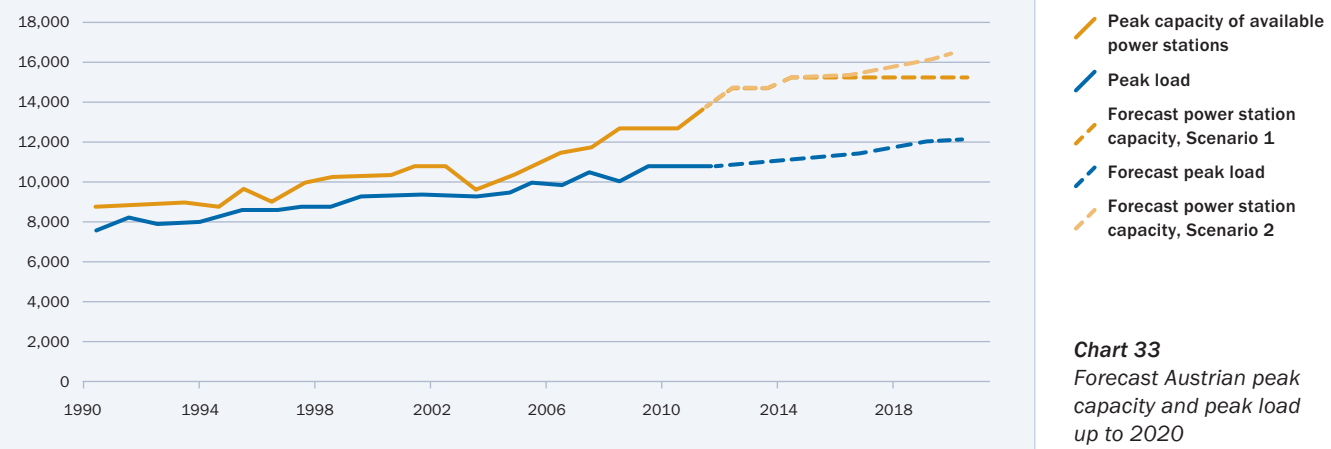


Chart 33
Forecast Austrian peak capacity and peak load up to 2020

Source: E-Control

are anticipated. ENTSO-E also expects Austria to be in a position to meet peak load comfortably up to 2025. The conservative scenario suggests excess capacity of over 10 GW in January 2020 after making allowance for a safety margin of 1.8 GW (a reasonable safety margin is arrived at by deducting all relevant parameters).

ELECTRICITY NETWORK EXPANSION AND MAINTENANCE

In addition to Austria's high and extra-high voltage grid, the international links between networks are vital to safeguarding security of supply and the functioning of a supraregional market. Consequently, the long-term availability of sufficient cross-border interconnectors is of great importance, and attention must constantly be paid to their maintenance and expansion. Since 2009 the Austrian transmission system operator APG has regularly published a master plan as the basis for medium- and long-term network planning. This master plan feeds into ENTSO-E's forecasts for security of supply, and into the mandatory ten-year network development plan which is published pursuant to section 37 Electricity Act 2010 and must be approved by E-Control.

The expansion programmes take long-term technical and economic aspects into account. Load forecasts and security- and reliability-related considerations also play an important part in network development. The surveys confirm the previous findings, according to which the national high and extra-high voltage grids will require constant maintenance and expansion over the next few years. Attention needs to be paid to the fact that rapid completion of the necessary approval procedures – especially those relating to expansion of the extra-high voltage grid – is critical to timely project execution, and to ensuring that planned additions to capacity are connected to the grid and become operational in good time.

Cyber-security initiative

With a view to dealing as effectively as possible with cyberattacks on Austria's electricity infrastructure, in January 2013 E-Control launched a cyber-security project aimed specifically at the country's electricity sector. The project is being implemented in conjunction with the electricity sector's interest group Oesterreichs Energie; Austrian Power Grid, the country's TSO; the Federal Chancellery; the federal ministries with competencies for security; and the Kuratorium Sicheres Österreich (Austrian Safety Board). The aim of this voluntary partnership was to carry out a detailed examination of systemic risks to security of electricity supply, using an analysis and evaluation process based on international standards and with the help of information and communication technology (ICT).

PROJECT OUTCOMES AND ACTION PLANS

The risk assessment, which was based on an evaluation of technical and organisational IT communications links on a number of levels, is the product of ten expert workshops as well as 28 interviews with specialists from the business and academic communities. From a total of 120 individual threats in 15 categories, 73 individual risks of varying priorities were identified for further investigation. Recommendations for dealing effectively with these risks, in line with their respective levels of threat, were then drawn up. To begin with, the systemic risks posed by cyberattacks on Austria's electricity network were collectively analysed and evaluated, and then clearly set out using a risk matrix. Secondly, recommendations were drafted which are now gradually being implemented by means of a structured follow-up process.

The insights obtained during this process will make a vital contribution to enhancing the security of the Austrian electricity grid.

COOPERATION AND FOLLOW-UP PROCESS

This joint initiative is a good example of a public-private partnership which serves to improve communications and collaboration between private- and public-sector organisations. Implementation of the action plans began in spring 2014 with the launch of an interdisciplinary follow-up process combined with ongoing evaluations and improvements. Building on the outcomes of the project, a separate examination and assessment of the ICT security risks facing the Austrian gas industry got under way in June 2014.

THE AUSTRIAN GAS MARKET

Network regulation

GAS SYSTEM CHARGES REVIEW PROCEDURE AS PART OF INCENTIVE REGULATION

The second incentive regulation period began on 1 January 2013, and has defined the regulation system for gas distribution networks since that date. The regulatory framework was slightly modified for the second regulation period (lasting until 31 December 2017), and the charges for 2013 were set using the adjusted system. The efficiency target for the end of 2017 remains in place, but the cost trajectory for the second period has been adjusted on the basis of the 2011 audited cost base and of target attainment. Both the system expansion factors (operating cost and investment factors) and the weighted average cost of capital have been revised. In addition, a quality element has been included in the regulation formula; however, this will have no impact for some time to come.

Section 79 Natural Gas Act 2011 requires the allowed cost from which the system charges are derived to be reflective of actual costs and to be determined separately for each network level. Only costs that are reasonable in terms of their origins and amount are allowable. Reasonable investment costs must be allowed, taking account of both historical costs and the cost of capital. Cost calculations have to be based on targets aligned to the potential efficiencies achievable by the companies. The costs determined must be adjusted for general targets reflecting productivity trends, and for changes in the system operator price index. Individual targets may be set on the basis of the efficiency of each system operator. In its allowed cost decisions, the regulatory authority can divide the time allotted (target attainment period) for meeting the targets into one or more regulatory periods. If amounts charged on by a vertically integrated gas undertaking influence the costs of a system operator, the latter must furnish adequate evidence that the parent's charges are justified. To prevent cross-subsidisation between transmission, distribution and retail activities, at the request of the regulatory authority the vertically integrated undertaking must submit documentation evidencing the basis of calculation for the charges in question.

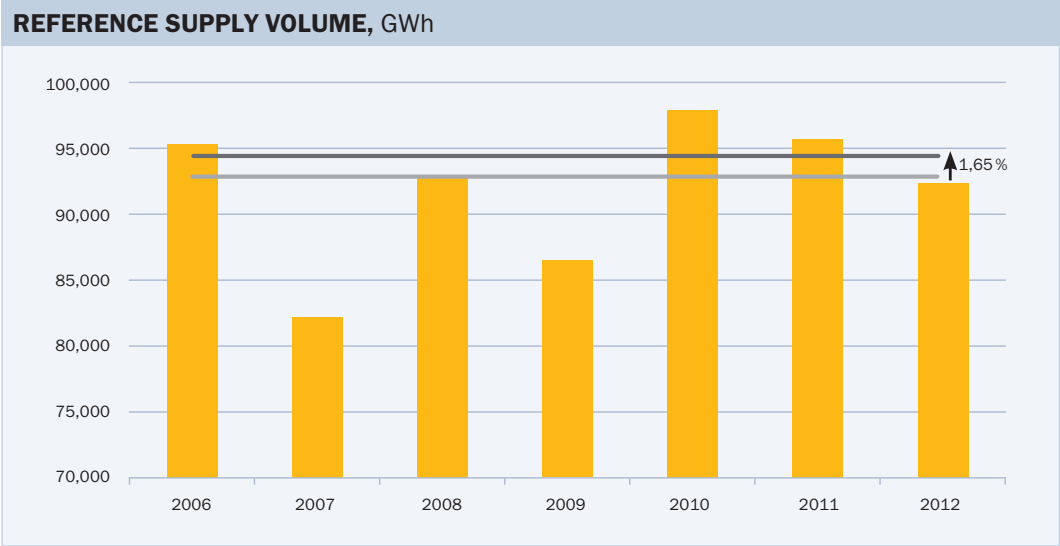
DETERMINATION OF SYSTEM CHARGES

As in the previous periods, investment in the Südschiene and Westschiene transmission pipelines totalling over EUR 400m up to the end of 2013 had a major impact on the *Gas-Systemnutzungsentgelte-Verordnung* (2013 Gas System Charges (Amendment) Ordinance 2014). As part of compensation for investment in these pipelines represents almost 40% of the grid level 1 costs and some 15% of the total network costs in the eastern market area.

To cover investment in distribution networks and additional operating expenses during the incentive regulation period, there are an investment and an operating cost factor. They are intended to create additional investment incentives for distribution system operators, primarily by promoting increased network penetration which results in better use of existing networks. The investment and operating cost factors ensure that distribution system operators are able to run their systems safely and reliably, and that they can extend their networks to connect new customers. In addition to the investments in pipeline projects, the first-time use of regulation accounts in most network areas as a result of lower demand for gas also pushed up costs.

Partly due to the fact that 2009 (when demand was relatively low) is no longer a base year, the reference supply volume increased slightly compared to the previous year. In order to account for seasonal changes in demand, the average for the three most recent years for which statistics are available is applied. The reference supply volume for the 2013 Gas System Charges (Amendment) Ordinance 2014 is the average for the 2010-2012 period.

Significant adjustments to the system charges in Styria and Lower Austria (see Charts 35 and 36) were chiefly necessitated by spending on the Südschiene pipeline, which was not offset by any increases in revenue due to



Source: E-Control

Chart 34
Reference volume

SYSTEM CHARGES FOR A TYPICAL CONSUMER, 90,000,000 KWH, 7,000 H, GRID LEVEL 2, cents/kWh

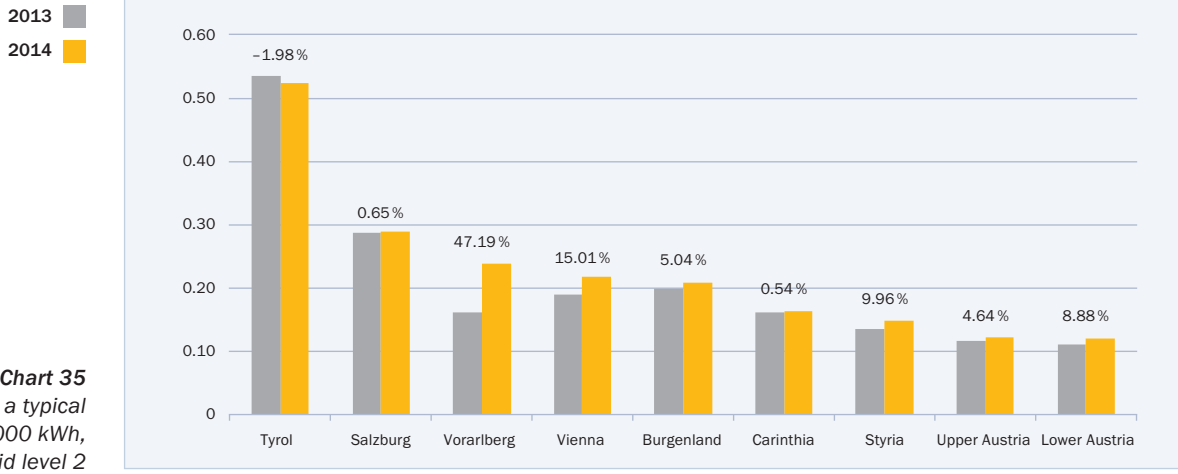
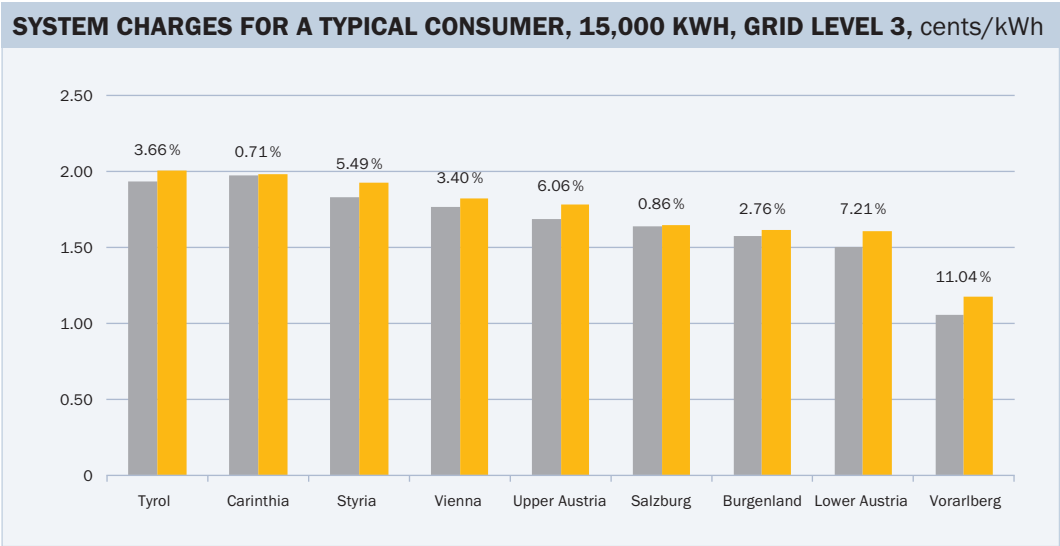


Chart 35
System charges for a typical consumer, 90,000,000 kWh, 7,000 h, grid level 2

Source: E-Control

the weak market confronting gas-fired power stations. The considerable increase in the system charges in the Vienna network area came mainly as a result of a massive rise in the uncontrollable costs referred to by section 79(6)(4) Natural Gas Act 2011. The change in the charges in the Upper Austria network area was largely due to first-time use of the regulation account in accordance with section 71 Natural Gas Act 2011. In Vorarlberg, the increase was due to the fact that the distribution area manager (DAM) began reserving capacity at entry points to the Vorarlberg market area from the German grid centrally on 1 October 2013, owing to the move to a new market model. The charges determination procedure took account of these costs on a full-year basis for the first time. Higher system charges mainly affected consumers in energy bands C and D, but the transition to the new market model significantly improved the quality of the services they receive. Although Tyrol also made the switch to the new market model, the move did not have such a large impact on costs thanks to volume growth in that network area.

For the first time, a special tariff for consumers with contractually agreed capacity of over 400,000 kWh/h (power station operators and other large consumers) was built into the system charges, allowing for billing of power stations on the basis of maximum daily output. This should guarantee that such



Source: E-Control

Chart 36
System charges for a typical consumer, 15,000 kWh, grid level 3

consumers are able to operate their plants more flexibly. These system users (primarily gas-fired power stations) can opt into or out of the special tariff once during a 12-month period. It is intended to ensure that large consumers make a bigger contribution to gas network costs in Austria.

The system charges calculation methods approved by the E-Control Executive Board in 2012 are applied to transmission networks. Based on these approved methods and the costs determined by the E-Control Executive Board, in 2012 the Regulation Commission set the transmission network charges (market area entry/exit charges) for the entire regulation period (2013-16).

INVESTMENT BY ENERGY COMPANIES

Current status of investments in Austria

In terms of investments by Austrian gas system operators, the priorities remain safeguarding security of supply for domestic demand, as well as promoting market integration and diversification of transportation routes. Following the completion of major projects such as the Westschiene and Südschiene pipelines in recent years, investment is now concentrated on the distribution network. The focus is on pipeline connections to storage facilities and on network replacement and renewal projects. A small number of projects aimed at expanding the network in Austria are also being implemented, but the growing pressure from alternative energy sources

GROSS INVESTMENT IN THE GAS NETWORK, EUR '000

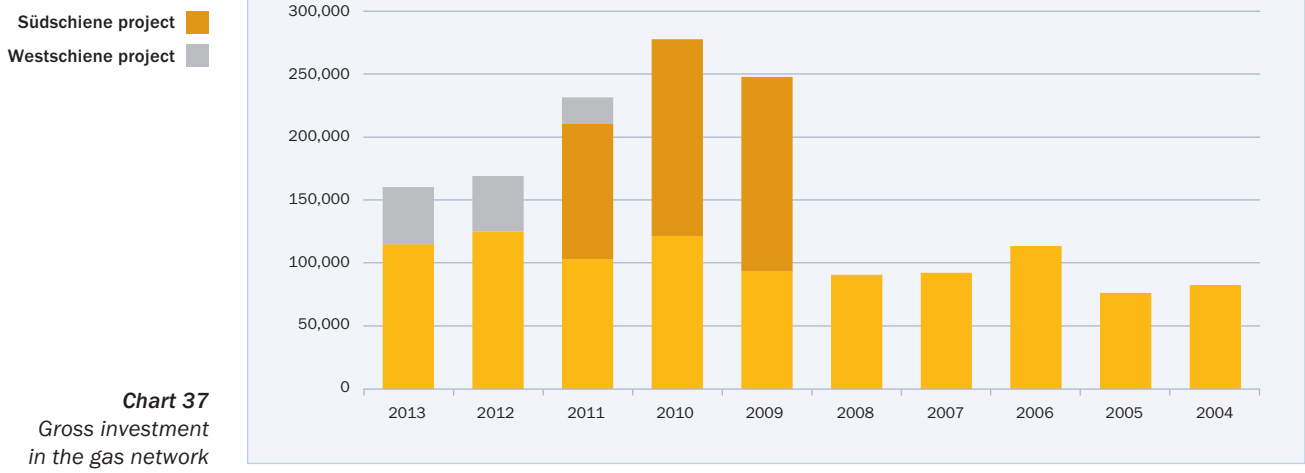


Chart 37
Gross investment in the gas network

Source: E-Control, aggregate company data, assets reported in the 2013 survey; historical costs

(district or local district heating) and energy efficiency requirements is having a major influence on project implementation. The chart below shows the slight change in gross investment in comparison to past years. As outlined above, major investments in transmission pipelines took place between 2009 and 2011. Investments in replacement and renewal of ageing infrastructure in the gas distribution network are also necessary. Investment of this kind has increased steadily since 2008, and will need to remain at a similar level in the years to come. As in the electricity network, the regulator has created the framework required to incentivise efficient investments in the gas network and to guarantee adequate compensation by means of network charges.

MARKET MECHANISMS

New market model

A full year of the new market model, including modifications

The new gas market model was introduced on schedule on 1 January 2013. Thanks to thorough preparation by all market participants, the changeover went smoothly and was virtually trouble-free: some problems cropped up at the turn of the year but they had no effect on the market and were quickly resolved as a result of cooperation between all the parties involved. Migration of contracts and capacity from the old model (point-to-point capacity reservation) to the new entry-exit system was also handled effectively.

Nevertheless, a few companies did not conclude the contractual agreements

required to register for clearing via the gas exchange at the virtual trading point (VTP) in time.

In order to enable these companies to begin operations under the new market model from 1 January 2013, a transitional arrangement was provided until 28 February 2013, known as the interim balance responsible party (iBRP) solution. It covered all balance responsible parties that had submitted an application to the regulator for a BRP licence before announcement of the determination of charges, but had not fulfilled the requirements for clearing via the gas exchange at the VTP by 16:00 on 17 December 2012. Each of these balance responsible party received a restricted licence pursuant to section 93 Natural Gas Act 2011, initially granted until 28 February 2013. If proof of eligibility for the gas exchange was not provided by that date, the licence was automatically withdrawn. This occurred in only one case.

Since the changeover, the market and the behaviour of market participants have been monitored in order to identify and respond quickly and effectively to any unintended developments.

In general, the market has benefited from the change in terms of system access, capacity management and the balancing regime. Since 1 April 2013, all primary transmission system capacity has been marketed on a centralised European platform, PRISMA. This has undoubtedly enhanced transparency and efficiency, and the common platform has made it much easier for TSO to offer bundled capacity products at cross-border interconnection points.

The handling of balancing energy through the gas exchange at the VTP has also developed positively. Sufficient liquidity is available on the within-day market. The experience of the first twelve months following introduction of the new market model shows that despite relatively high market concentration in some areas, adequate liquidity was usually available to meet balancing energy needs in the distribution area (see the section “Balancing energy” below for further details). While the gas exchange at the VTP has performed well, trading volumes on the OTC market there have also recovered strongly after a sharp fall at the time of the transition, reaching a record high in October 2013.

One aspect of the new market model that drew significant criticism was incentives of +20% and -10% on the hourly volume-weighted average price of balancing energy procured by the DAM in relation to consumers covered by the hourly balancing regime. Market participants believed these incentives were too high and that they should be removed and replaced by a symmetrical incentive structure. E-Control had opted for an asymmetrical structure in order to ensure that this major transition met the requirements for security of supply. Based on experience from the first few months of the new market model, the first wave of amendments to the Gas Market Model Ordinance 2012 brought about a reduction in the incentives to a symmetrical surcharge and offset rate of +/- 3%, effective from 1 April 2013. This considerable reduction was

CEGH OTC VOLUMES AND CHURN RATE, 2013

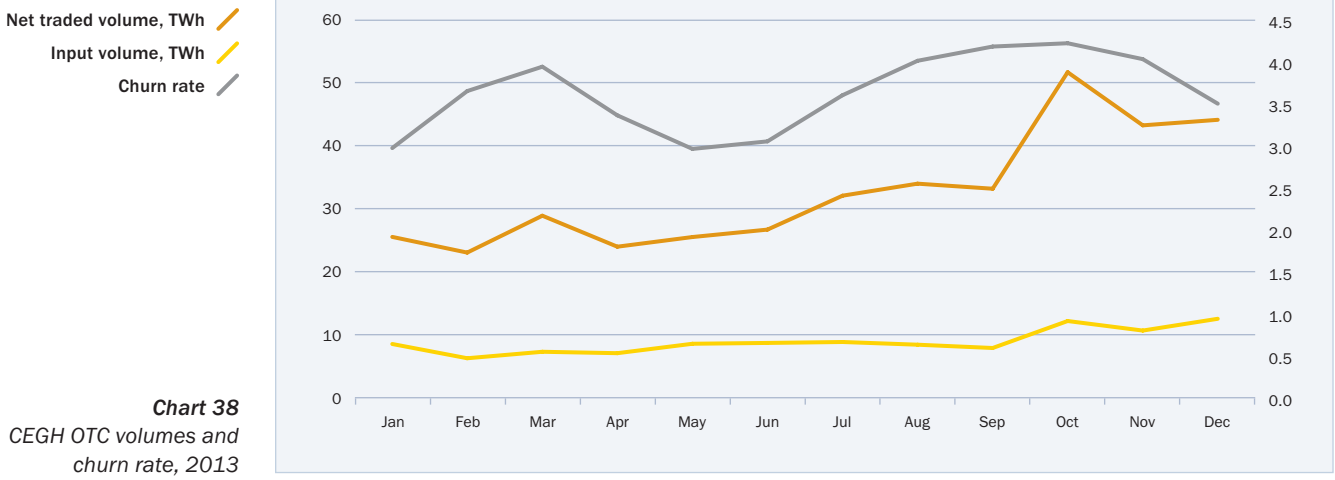


Chart 38
CEGH OTC volumes and churn rate, 2013

Source: CEGH

possible due to the large amount of linepack available, and the fact that at the time movements in the clearing and settlement agent's contribution account had become predictable. The amendments also raised the upper threshold for consumers subject to daily balancing from the original standardised load profile (SLP) threshold to the contractually agreed maximum capacity of 10,000 kWh/h, allowing an even greater range of consumers to benefit from daily balancing.

The second round of amendments to the Gas Market Model Ordinance 2012 was enacted on 1 October 2013 and contained system optimisation measures, mainly in relation to data transmission obligations. These included a provision stating that the DAM must determine and transmit demand forecasts for SLP customers by supplier, rather than aggregated by balance responsible party. Additionally, steps were taken to avoid updating of balancing energy prices by the DAM as part of daily balancing for consumers where balancing energy has not been physically called off, by nstead using the benchmark exchange price in such cases and applying an incentive of +/- 10%.

The third wave of amendments to the Ordinance came into force on 1 January 2014, and was aimed at reducing the difficulties clearing and settlement agents experience when forecasting the results of

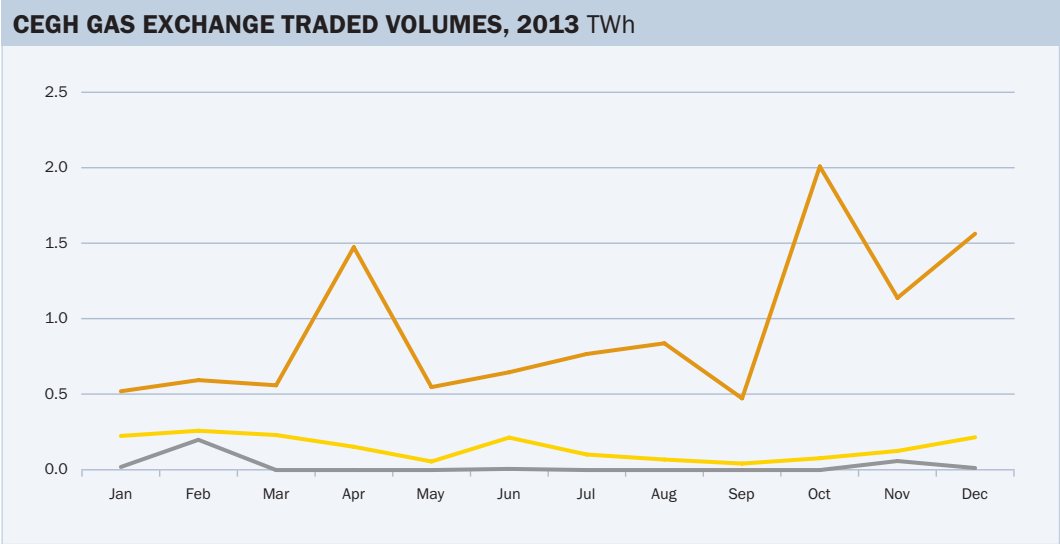


Chart 39
CEGH Gas Exchange traded volumes, 2013

Source: CEGH

monthly balancing energy settlement and the related effects on the market area's contribution accounts.

The period for determination of system user contributions by clearing and settlement agents was reduced from six to three months, enabling them to adapt balancing energy settlement more quickly in response to factors affecting volumes and prices.

Apart from the Ordinance and amendments to it, various other measures were implemented in order to optimise the market model. These included collaborating with the operator of the VTP to reduce transaction and registration costs. The market manager, in consultation with E-Control, also reduced the balancing incentive markup, introducing graduated mark-ups instead.

New market model in Tyrol and Vorarlberg
According to Austrian legislation, "Systems or parts of systems in a market area that is supplied exclusively from a neighbouring member state, and for which there is no independent balancing energy market in the market area, are to make operational arrangements with the system operator in the neighbouring member state, so that partial or full supply from the neighbouring market area is possible." In addition, "Systems or parts of systems may form market areas with neighbouring system operators in other

member states, where conducive to the purposes of the European internal market."

In light of these provisions, the Cross-border Operating Strongly Integrated Market Area (COSIMA) gas market model was developed to link the Austrian market areas of Tyrol and Vorarlberg more closely with the NetConnect Germany (NCG) market area, and incorporated into the 2012 Gas Market Model Ordinance. COSIMA was introduced in the Tyrol and Vorarlberg market areas as of 1 October 2013.

From the perspective of suppliers and retailers, the COSIMA market model removes the barriers between the two provinces and the NCG market area by exempting them from the need to reserve capacity. All capacity required to supply consumers in Tyrol and Vorarlberg is reserved by the Austrian DAM, and no reserved capacity is allocated to individual balance groups in Germany or Austria. Exit capacity for gas that is transported through Vorarlberg to Liechtenstein and Graubünden is still reserved by suppliers directly with the system operator, terranets.

A requirement of COSIMA was that it be compatible with the existing regulatory framework in the neighbouring market areas, so that there was, as far as possible, no need for regulations to be amended. The DAM for Tyrol and Vorarlberg assumed the role of delegated system operator and "translator" between the regulatory frameworks of all the participating market areas, and as a result this requirement has to a large extent been fulfilled. For market participants, COSIMA simply involves setting up corresponding balance groups in the different market areas. These can either be based on existing groups, or new ones can be formed. A balance group in Tyrol or Vorarlberg, established in accordance with the Austrian market model, must be assigned to a specific corresponding group in the NCG market area for gas transfers.

Transfers of gas destined for the Tyrol and Vorarlberg market areas take place by way of nominations at the NCG VTP. The DAM accepts the gas at the entry point to the NCG VTP and organises its transportation to the Tyrol and Vorarlberg market areas. Gas transferred at the NCG VTP is deemed to be directly delivered to Tyrol or Vorarlberg. From the perspective of the German balance groups there are no other rules for shipments to the Tyrol and Vorarlberg market areas.

Gas transferred to German balancing circles at the NCG VTP is allocated to the corresponding balance groups in Austria. The balance groups' schedule notifications for the purpose of supplying final consumers (or for injection/withdrawal at other entry/exit points in the Austrian market areas) are offset against the quantities of gas transferred to the corresponding German balance groups at the NCG VTP. Under the Austrian market rules, the balancing energy settlement mechanisms also apply to this gas. Clearing and settlement is carried out by the clearing and settlement agent.

COMMUNICATION FLOWS IN THE COSIMA MODEL

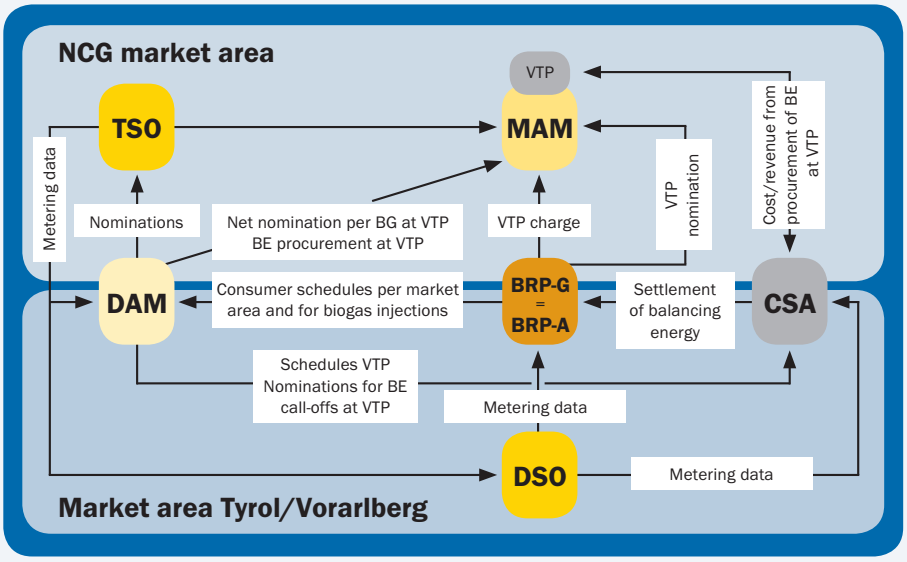


Chart 40
Communication flows in the COSIMA model using the example of supplies to consumers in the Tyrol and Vorarlberg market areas

Source: E-Control

PHYSICAL BALANCING ENERGY AS A PROPORTION OF TOTAL CONSUMPTION, %

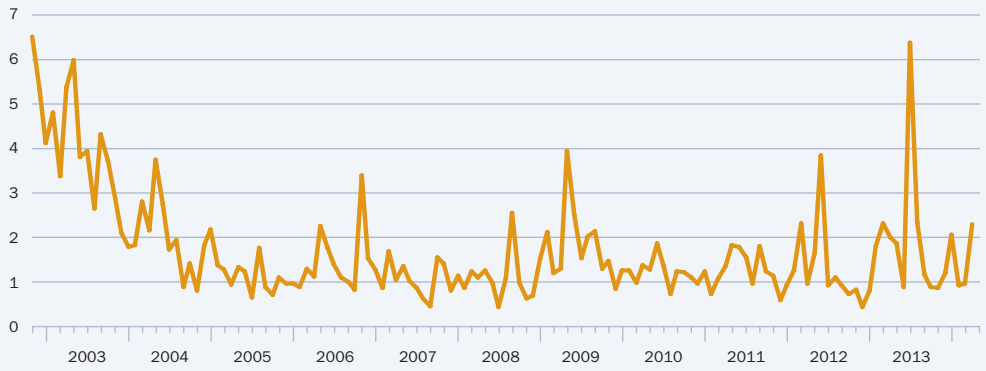


Chart 41
Physical balancing energy as a proportion of total consumption, %

Source: AGCS

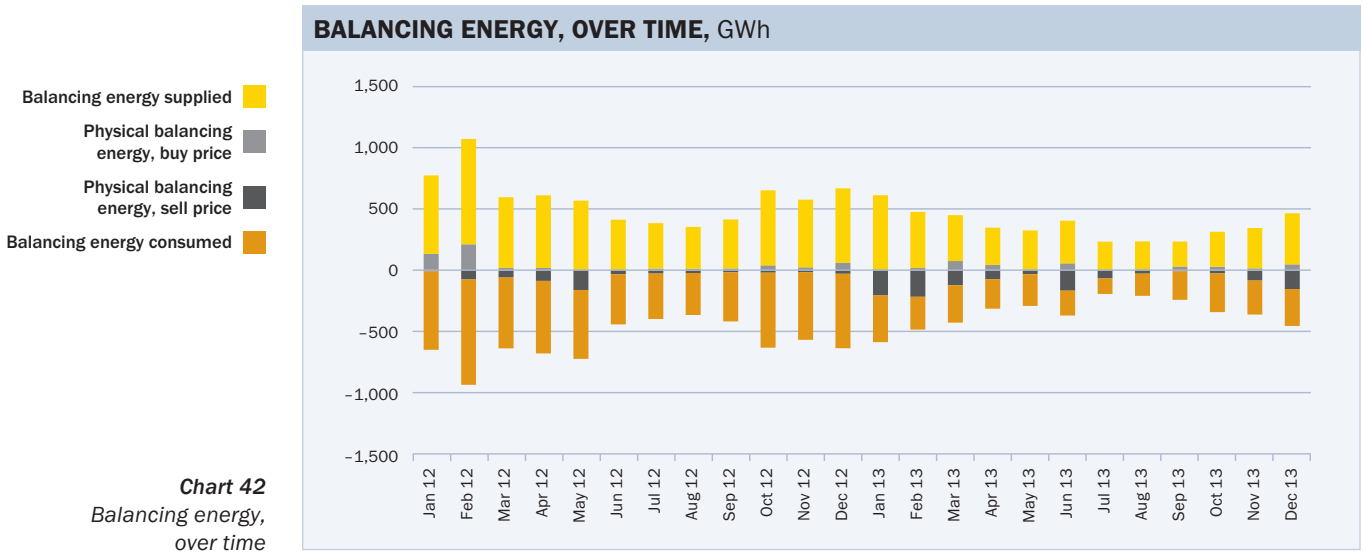


Chart 42
Balancing energy, over time

Source: E-Control

Balancing energy

Chart 41 shows physical balancing energy as a proportion of total consumption (all users subject to daily or hourly balancing). Physical balancing energy comprises all volumes called off by the DAM from the merit order list (MOL) and the exchange (excluding linepack).

The chart shows that demand for physical balancing energy has risen. This is to be expected given the theoretical basis of the daily balancing approach, but the extent of the increase is mainly due to oversupply, which can be extreme at times. The high of 6.38% of consumption reached in June is comparable to the level seen when the market was liberalised in October 2002. This is the result of low consumption in June (which continued into July and August), as well as call-offs from the MOL due to emergency measures taken and the resulting high price of balancing energy, which balance responsible parties could have foreseen, leading to tactical decisions in respect of registration.

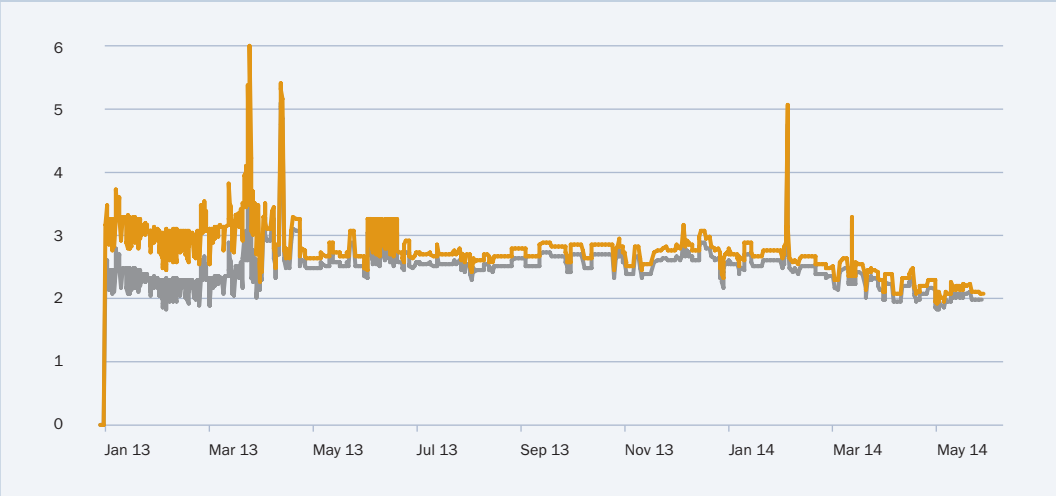
The peak in balancing energy in June 2013 can be seen in Chart 42. A strong annual cycle in the last two years is also evident.

BALANCING ENERGY PRICES FOR USERS SUBJECT TO DAILY BALANCING, cents/kWh

Source: AGCS

Chart 43
Balancing energy prices for users subject to daily balancing

BALANCING ENERGY PRICES FOR USERS SUBJECT TO HOURLY BALANCING, cents/kWh



Source: AGCS

Chart 44
Balancing energy prices for users subject to hourly balancing

The relatively high level of balancing energy sales in December 2013 reflected the unusually mild winter up to that point. Many companies were probably oversupplied and were forced to sell gas on the spot market.

As published on the CEGH REMIT platform, from 2-3 February 2014 there was a market halt due to technical problems. This meant that balancing energy was called off via the MOL at buy prices of up to EUR 70/MWh.

Storage market

The legal framework for the storage market

Access to gas storage systems is governed by sections 97 et seq. Natural Gas Act 2011. The Act prescribes negotiated third-party access (section 98(1)). However, it requires E-Control to prepare and publish a report on the Austrian flexibility and storage market every three years, or at the request of a storage system operator or a party entitled to access to storage (section 98(2)).

The storage charges will continue to be regulated by means of benchmarking. If the storage charges in Austria exceed the average charges for comparable services in EU member states by more than 20%, the regulator may determine the cost base of storage pricing (section 99(2)). All storage contracts have to be submitted to E-Control (section 101).

The provisions of Art. 15 Regulation (EC) No 715/2009 on third-party access services concerning storage have not been transposed into Austrian law.

However, sections 103 and 104 Natural Gas Act 2011 contain detailed arrangements for transposition of Arts. 17 and 22 of the regulation, dealing with the principles of storage capacity allocation mechanisms and congestion management procedures, and capacity rights trading, respectively. The capacity allocation procedure adopted must be appropriate to the prevailing capacity situation. Auctions must be held if demand exceeds supply.

As regards congestion management, section 104 Natural Gas Act 2011 requires the storage system operators to set up an overarching secondary capacity trading platform or to cooperate on the creation of a joint platform. It states that storage service contracts must include clauses designed to prevent capacity hoarding, and that unused contracted capacity must be sold to third parties via the secondary market platform in the event of congestion.

The transparency requirements of Art. 19 Regulation (EC) No 715/2009 for storage system operators and the provisions of Art. 15 on third-party access services concerning storage have been in force since 3 March 2011.

Changes to system access for storage operators

The principles of system access for storage facilities (authorisation and tariff determination) are set forth in sections 27 and 73 Natural Gas Act 2011. Section 16 Gas Market Model Ordinance 2012 sets out detailed provisions for system access for storage facility operators,

STORAGE CAPACITY IN AUSTRIA						
Storage system operator/storage facility	**Injection rate, MWh/h capacity**	**Share of total injection**	**Withdrawal rate, MWh/h capacity**	**Share of total withdrawal**	**Working gas volume, MWh volumen**	**Share of total working gas volume**
OMV Schönkirchen	7.306		10.790		20.007.000	
OMV Tallesbrunn	1.405		1.798		4.496.000	
OMV Thann	1.293		1.461		2.810.000	
Total OMV storage capacity	**10.004**	**28%**	**14.049**	**32%**	**27.313.000**	**30%**
RAG Puchkirchen	5.800		5.800		12.100.000	
RAG Haidach 5	225		225		1.100.000	
RAG Aigelsbrunn	562		562		180.000	
RAG Nussdorf/ Zagling	681		681		1.300.000	
Total RAG storage capacity	**7.265**	**21%**	**7.265**	**17%**	**14.699.000**	**16%**
E.ON Gas Storage 7fields	6.742	19%	10.112	23%	19.415.000	21%
Storage facilities connected to the market area	**24.011**		**31.426**		**61.427.000**	
Astora Haidach	3.733	11%	4.133	9%	9.900.000	11%
Gazprom Haidach	7.467	21%	8.267	19%	19.800.000	22%
Total	**35.211**	**100%**	**43.826**	**100%**	**91.127.000**	**100%**

Source: corporate websites – www.omv.com; www.rag-energy-storage.at; www.astora.de/speicher.html; www.eon-gas-storage.de; www.gazpromexport.ru/en/haidach/

Table 15
Storage capacity in Austria, June 2014

bringing about a change to the arrangement that was in place until the end of 2012. Since that time, storage companies have been required to make an annual booking with the system operator for the maximum injection and withdrawal capacity to be reserved in the following calendar year.

Grid utilisation tariffs for storage facilities that are connected to the transmission network (7fields and the LAB facility in Slovakia) are specified in section 4 Gas System Charges Ordinance 2013, and those for facilities that are connected to the distribution network are specified in section 12. These charges are only payable for withdrawals from the system.

Storage capacity in Austria

In 2013 Austrian storage capacity[39] remained at 2012 levels, with working gas volume

[39] Due to its geology, Austria only has pore storage facilities.

(WGV) of 83,300 GWh. Eon Gas Storage increased its storage capacity by 50% as of 1 April 2014, raising the total WGV at Austrian storage facilities to 91,127 GWh – greater than annual consumption in 2013.

The Haidach storage facility is not currently linked to the market area, but projects designed to make such a connection possible are already included in the long-term plans. Supplies from the German gas grid are used to fill Haidach, and storage volumes for the Austrian market are imported from Germany.

Storage volumes at facilities directly connected to the market area amount to 70% of annual consumption.

The LAB storage complex in Slovakia, operated by Nafta and Pozagas, is connected to the VTP via the MAB pipeline. This facility has a total WGV of about 3bn cu m (approx. 33,000 GWh) and withdrawal capacity of close to 40m cu m/day. Most of this capacity is used by Slovakian gas undertakings, so the storage capacity available to the Austrian gas market is not known.

Use of storage capacity in 2013

The percentage full rate at Austria's gas storage facilities rose year on year to reach 91% at the start of the 2012/13 gas year. Cold weather in February and March 2013, which lasted into April, significantly extended the withdrawals season, and the refilling

NATURAL GAS IN AUSTRIA – MONTH-END STORAGE LEVELS, GWh

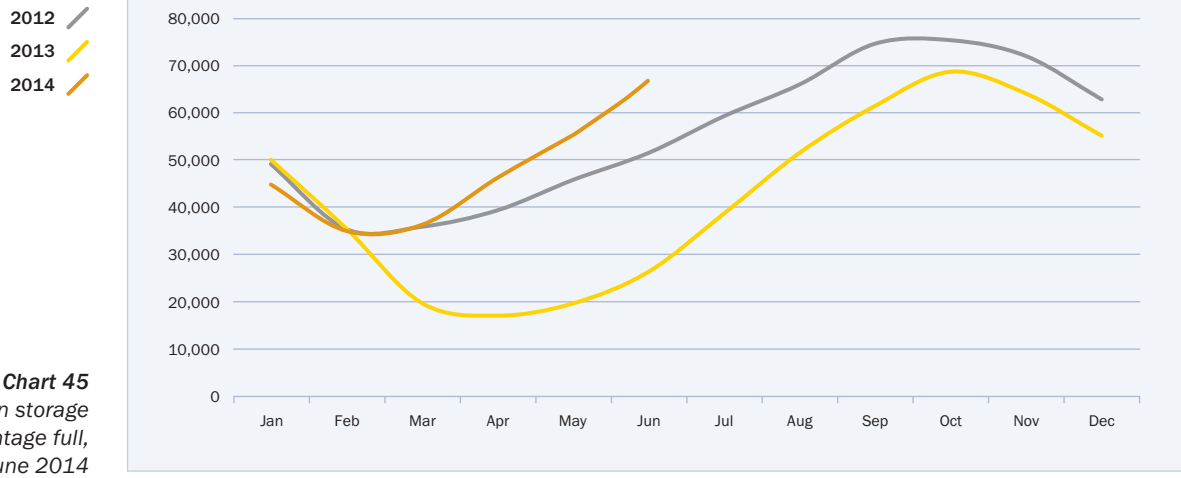


Chart 45
Austrian storage facilities, percentage full, 2012-June 2014

Source: E-Control

of storage facilities only began at the end of April (see Chart 45). Consequently, the percentage full rate at the beginning of the 2013/14 storage year was down markedly year on year.

Injection volumes were also lower than in the previous year, but due to the warm 2013/14 winter, the percentage full rate in March 2014 had reached the 2012 level.

Use of storage capacity was particularly strong in March 2013: at 16,605 GWh, withdrawals from storage were 60% higher than domestic gas consumption in that month (see Chart 46). Injection was much higher in July, August and September than during the same months in the previous year. In 2014, high injection volumes were recorded as early as April, doubtlessly as a result of low spot prices.

Storage products

Storage system operators provide standard products that differ in terms of their key indicators (see Table 16). They also offer unbundled services such as additional injection or withdrawal capacity and monthly and tailored products.

Prices for storage products are published on the operators' websites or are specified in the allocation procedure (in the case of allocation via Store-X).

INJECTIONS TO AND WITHDRAWALS FROM STORAGE IN AUSTRIA, GWh

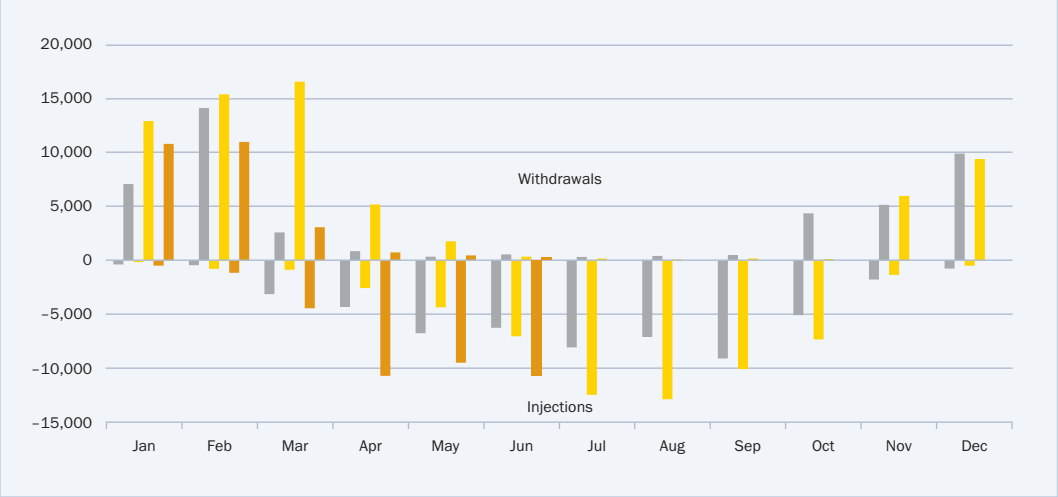


Chart 46
Injections to and withdrawals from storage in Austria, 2012-June 2014

Source: E-Control

BUNDLED PRODUCTS OFFERED BY AUSTRIAN STORAGE COMPANIES

		Working gas volume, MWh	Withdrawal capacity, MWh/h	Injection capacity, MWh/h	Remarks
OMV Gas Storage	Classic Bundled Unit	20.160	8,96	6,72	Fixed or flexible withdrawal and injection periods, minimum contract term 1 month
RAG Energy Storage	Long-term storage service	16.800	10,00	10,00	Minimum contract term: 3 years
Eon Gas Storage	7Fields Typ D	15.000	10,00	4,55	Minimum contract term: 1 year
Eon Gas Storage	7Fields Typ E	20.000	10,00	5,56	Minimum contract term: 1 year
Astora	Astora Pack*	11.000	5,00	5,00	Minimum contract term: 1 year
Gazprom Export	Gazprompack**	56.000	24,08	24,08	Minimum contract term: 1 year

** WGV: 22,000 KWh/h; injection/withdrawal capacity: 10 kWh/h; minimum booking: 500 bundles*
*** WGV: 1,000 cu m/h; injection/withdrawal capacity: 0.43 cu m/h; minimum booking: 5,000 bundles*

Source: corporate websites – www.omv.com; www.rag-energy-storage.at; www.astora.de/speicher.html; www.eon-gas-storage.de; www.gazpromexport.ru/en/haidach/

Table 16
Bundled products offered by Austrian storage companies

Storage capacity allocation and bookings
The Austrian storage system operators offer capacity through online booking systems, by means of application forms on their websites, and increasingly via the Store-X platform.

In November 2013 and January 2014, OMV Gas Storage allocated a total of 3.7bn kWh of WGV – almost 14% of the total WGV at OMV's storage facilities – to the Austrian CEGH VTP, using the keyed procedure whereby the supplier can specify a fixed price.
Eon Gas Storage also marketed capacity for the second phase of expansion at its storage facility on Store-X. Capacity was offered for periods of between two and five years.

The storage system operators' clients are domestic and foreign gas undertakings. Information on available storage capacity is published on the operators' websites. Eon Gas Storage, OMV Gas Storage and Astora have no further capacity for the 2014/2015

storage year, while RAG Energy Storage and Gazprom Export still have around 7% of their capacity available.

Storage customers, including Axpo[40] and Shell, also market storage capacity through Store-X.

Increased transparency: publishing data on storage use

Data on utilisation of storage capacity (WGV status, injections and withdrawals) are published daily for the previous day on the storage system operators' websites. Additionally, since 1 January 2013 data from storage facilities directly connected to the market area (the facilities operated by OMV Gas Storage, RAG Energy Storage and Eon Gas Storage) have been published on the market area manager's[41] data platform. European data, including for Austria, is published by GSE.[42] This comprises information from OMV Gas Storage, RAG Energy Storage and Astora; Eon Gas Storage capacity is published under the data for Germany, since the 7fields facility is connected to the German grid. As a result, the aggregate data does not correspond with that compiled by the market area manager.

Quality standards and safety

Two separate fields relating to the quality of system operators' network

SATISFACTION WITH AUSTRIAN GAS SYSTEM OPERATORS, %

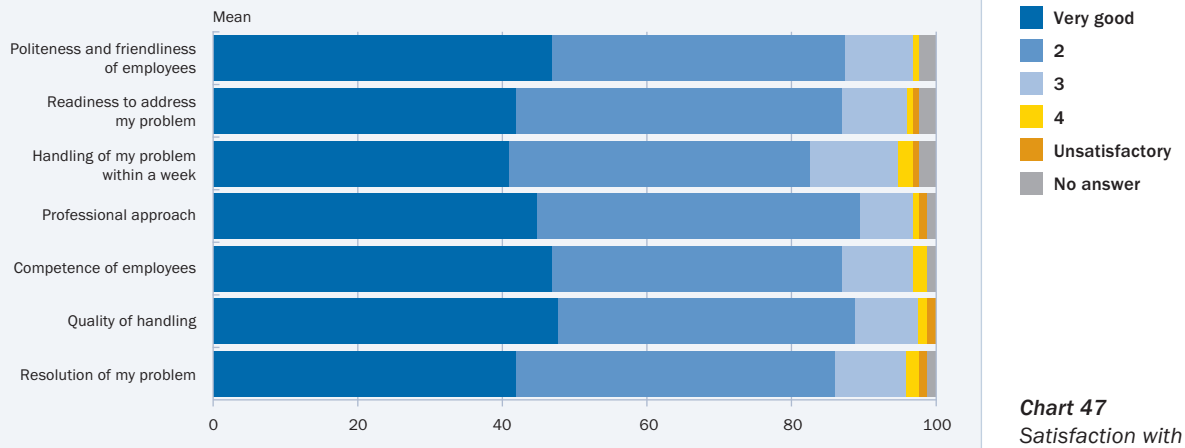


Chart 47
Satisfaction with Austrian gas system operators

Source: E-Control

[40] See Energate, 17 March 2014: Axpo und Eon Gas Storage schließen Vermarktungen ab, http://www.energate-messenger.de/news/141566/Axpo-und-Eon-Gas-Storage-schlie%DFen-Vermarktungen-ab (German only)
[41] https://mgm.gasconnect.at/gca_mgm/mgm/visualisation.do?type=storage&reset=true&reset=true&lang=en
[42] https://transparency.gie.eu.com/daily_info.php

SATISFACTION WITH AUSTRIAN GAS SYSTEM OPERATORS

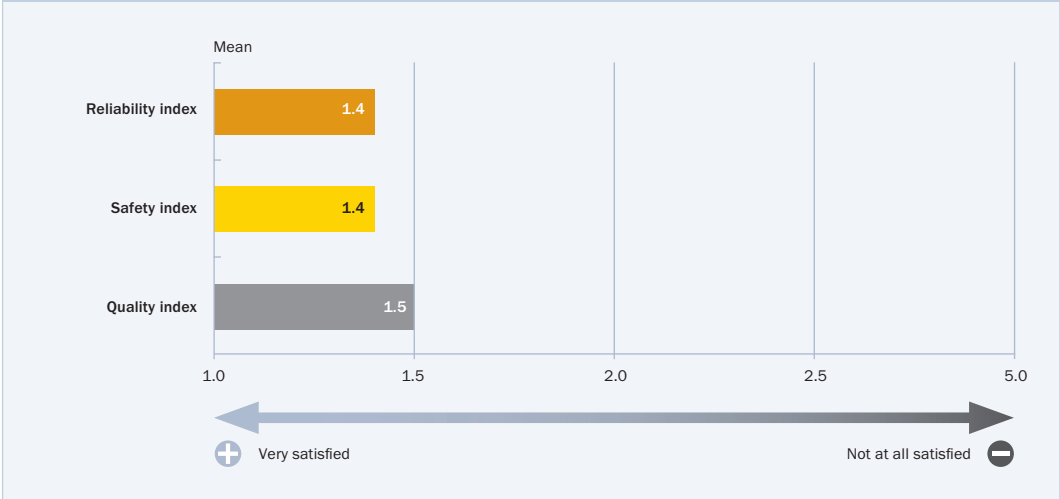


Chart 48
Satisfaction with Austrian gas system operators

Source: Austrian Association for the Gas and Water Industry (ÖVGW) press release

services were investigated in 2013. On the one hand, we looked at the quality of the commercial performance of system operators on the basis of the *Gasnetzdienstleistungsqualitätsverordnung* (Ordinance on Gas System Service Quality), and on the other hand there were evaluations of how satisfied customers were with their system operator.

Customer satisfaction with system operators
Two surveys of customers' satisfaction with system operators were carried out during the year. One was commissioned by E-Control, and the second by the system operators themselves. They produced very similar and thoroughly positive results. Both of the studies reported a high level of customer satisfaction.
In the survey carried out on behalf of E-Control, customers were interviewed about:

- The politeness and friendliness of system operator employees
- Readiness to address problems raised
- Handling of the problem within one week
- Professional approach
- Competence of employees
- Quality of handling
- Resolution of the problem

The questions were defined by E-Control and the interviews were conducted by market research institute IFES. Without access to specific customer data, a large number of phone calls were required to compile an informative study. Only a small number of

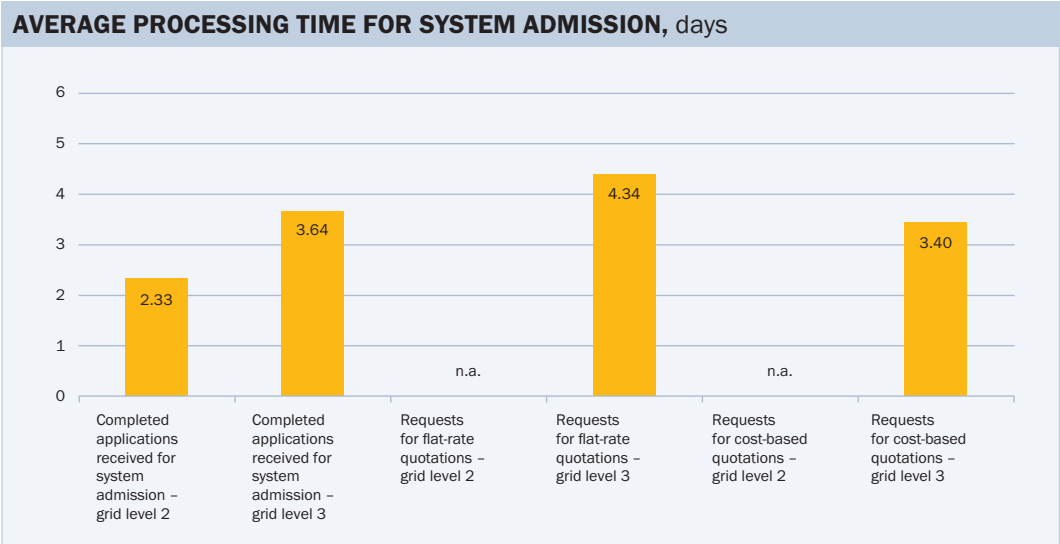


Chart 49
Average processing time for system admission
Status as at 4 Sep 2014

Source: E-Control

networks were included.
Research for the second study was commissioned individually by the system operators. Users were asked by market research company market-mind about their satisfaction with their system operator in terms of reliability, safety and quality. 15 system operators participated in the study, generating a substantial quantity of customer data. The disadvantages of the study from E-Control's point of view were that it was not possible to influence the questions used, and that hardly any results broken down by system operator were supplied to the regulator.

With a view to combining the advantages of both studies, the system operators and E-Control are planning to cooperate on the collection of information on customer satisfaction in 2014. Questions will be developed jointly and interviews conducted using contact information held by the system operators.

Quality of commercial services offered by system operators
The quality of commercial services provided by system operators was assessed on the basis of the Ordinance on Gas System Service Quality. Using a standardised questionnaire, all system operators were asked about the number and average processing time of:

> System admissions
> System access permissions
> Bills issued for system services
> Disconnections and restoration of system

access
- Supply disturbances and interruptions
- Meter readings
- Appointments kept
- Customer information and complaints management
- Safety and reliability of system services

Chart 49 shows an average processing time of 3.64 days following receipt of completed applications for system access at grid level 3, whereas requests for flat-rate and cost-based quotations took an average of 4.34 and 3.40 days to process, respectively.

The rate of appointments kept as agreed for repairs, maintenance and meter readings was very high in 2013, averaging 99.75% of all responses.

Overall, it can be concluded that most system operators meet the quality standards defined in the Ordinance on Gas System Service Quality. There was room for improvement on the part of a number of individual operators, and a need to catch up in terms of developing suitable IT infrastructure in order to assess, record and report on adherence to the defined quality standards within their organisations.

A direct comparison of responses for individual system operators revealed some significant peaks and fluctuations. E-Control is currently carrying out interviews with system operators in order to examine these deviations and to arrive at an accurate picture of commercial service quality.

Safety

System operators in Austria are required to comply with the relevant technical rules for ensuring safe and reliable operation of the gas network. Compliance must be certified by an accredited auditing, monitoring or certification body. According to the E-Control survey on adherence to the Ordinance on Gas System Service Quality, around 90% of system operators are certified either by TÜV AUSTRIA or the Austrian Association for the Gas and Water Industry (ÖVGW).

GAS TRANSPORTATION

Key topic 2: capacity allocation on the gas transmission market

Since April 2013, allocation of capacity rights for cross-border gas shipments has taken place on the PRISMA European platform (https://www.prisma-capacity.eu), where the Austrian TSOs also market capacity. In its final stage of development, PRISMA will operate in accordance with the Network Code on Capacity Allocation Mechanisms (NC CAM) drawn up by the European Network of Transmission System Operators for Gas (ENTSOG), and will facilitate the marketing of primary capacity rights by ENTSOG members. PRISMA's platform for allocation of secondary transportation rights went online in 2014. The various capacity products on PRISMA are bought and sold at auctions. The following section provides a detailed analysis of this new market, in particular its functioning, efficiency and liquidity. The main focus is on the interplay between gas trading processes and capacity allocation, particularly in short-term trading.

Allocation of transportation capacity takes place on PRISMA for all interconnection points (IPs) at the same time, with the aim of enabling the flexible formulation of offers on the gas market. The platform was set up in 2013 with 19 TSOs, which are also shareholders in PRISMA. Three further TSOs joined on 1 January 2014, and as a result PRISMA is currently the central platform for capacity allocation in Europe. Before shippers can participate in auctions, they must register with PRISMA and be approved by the gas system operators from whom they wish to purchase capacity at auction. Entities that were registered on the TRAC-X platform – the predecessor to PRISMA – are automatically transferred to the PRISMA system. However, they must supply additional company information to the platform and the system operators (including a credit check). A shipper can only participate in an auction after it has been approved by the system operator.

The commercial value of transportation rights is closely related to prices at individual gas hubs and the transportation costs based on the respective entry-exit tariffs. Arbitrage trades will be worthwhile for shippers if the price differentials between the various hubs are greater than the entry-exit tariffs that must be paid. When this is the case, it can be assumed that demand for cross-border capacity will increase and that shippers will be prepared to pay a higher price for such capacity. Because the reserve price in PRISMA auctions is equivalent to the respective entry-exit tariff, it is expected that prices on PRISMA will be subject to mark-ups roughly in line with the price differentials between the hubs. One objective of the empirical analysis presented here is to verify this expected correlation.

The following sections provide qualitative descriptions of the products and the auction mechanism on PRISMA. Unused capacity and the secondary market are also covered. The empirical analysis examines prices at the major European gas hubs, with a particular focus on price correlation and price differences. This is followed by a detailed account of Austria's key cross-border IPs – Überacken, Oberkappel and Arnoldstein. These are the main links between Austria and the neighbouring German and Italian markets. Auction results, entry-exit tariffs, price differentials and capacity utilisation at each of these IPs are included in the quantitative evaluation.

Products on the PRISMA platform

A wide variety of capacity products are marketed on PRISMA, and they can differ in a number of ways. Both individual and bundled capacity is offered, and products also vary in terms of firm or interruptible capacity, restrictions placed on free allocation, and the term for which capacity is offered.

The first feature that will be examined here is the difference between bundled and non-bundled products. In the case of bundled products, entry and exit capacity on each side of an IP is offered together (e.g. exit capacity from Austria, entry capacity to Germany); non-

bundled products offer entry or exit capacity separately (e.g. only Austrian exit capacity). Neighbouring TSOs cooperate in order to offer bundled capacity.

One aim is to increase trade in bundled products, since they help to simplify cross-border gas transportation in Europe. For this purpose, available capacity held by system operators is collected so that it can be offered as bundled products in auctions. However, in the past some system users purchased non-bundled capacity (e.g. exit capacity from Austria) under long-term contracts, on the assumption that suitable corresponding capacity (e.g. entry capacity into Germany) could be obtained on the market at any time. As a consequence of bundling entry and exit capacity on PRISMA, the amount of non-bundled capacity on offer is reduced, so that shippers with long-term contracts may be unable to find suitable non-bundled capacity on the market. This only affects IPs that distinguish between entry and exit capacity.[43]

As well as bundled and non-bundled products, there is also a distinction between firm and interruptible capacity. Purchasers of firm capacity have a guaranteed entitlement to the contractually agreed capacity, whereas agreed interruptible capacity may be reduced or interrupted in case of congestion or technical problems. This risk is reflected in some countries by lower prices. In Austria, the prices for booking firm and interruptible capacity are currently the same; when an interruption occurs, the price is reduced on a pro rata basis or by applying a refund factor. PRISMA is currently developing a concept that should allow for interruptible capacity to be converted into firm capacity, and for the return of firm capacity.

As well as firm and interruptible capacity some IPs offer combinations of the two, stemming from the old point-to-point system. Freely allocable capacity can be seen as the simplest form of firm capacity, and forms the basis of the entry-exit system. Having acquired freely allocable capacity, the purchaser is by definition not tied to a specific transport route, and is free to choose the entry/exit point at which the capacity is utilised. This high degree of flexibility represents added value for the system user. Dynamically allocable capacity, meanwhile, is a mixed product form. This type of capacity can be utilised as firm capacity at specific, contractually agreed entry/exit points, or as interruptible capacity at other entry/exit points or the VTP.

The various standard capacity products are offered in auctions for a range of different time periods (see Table 17). Capacity may be purchased for:

- One year (from the beginning of the gas year on 1 October)
- One quarter (beginning on 1 October, 1 January, 1 April or 1 July)
- One month (beginning on the first day of the month)
- One day (on a day-ahead basis)

[43] An example is Oberkappel, where exit capacity from Austria is somewhat higher than entry capacity into Germany.

The primary focus is on auctions of yearly capacity, and only 10% of capacity must be reserved for auctions of products for shorter periods (quarterly, monthly or daily capacity). Since capacity utilisation is dominated by long-term contracts, capacity offered on PRISMA represents only a small proportion of the total technical capacity at many IPs.

OVERVIEW OF PRISMA AUCTION PROCESSES

Time period	Auction process	Auction date	Frequency of auctions	Announcement of available capacity
Annual	Multi-stage ascending price auction	First Monday in March	Annually	4 weeks prior to auction
Quarterly	Multi-stage ascending price auction	First Monday in June	Annually	2 weeks prior to auction
Monthly	Multi-stage ascending price auction	Third Monday of each month	Monthly	1 week prior to auction
Day-ahead	Continuous one-stage auction	Daily	Daily	At opening of auction
Within-day	Continuous one-stage auction	Daily	Several times a day	

Source: PRISMA, E-Control analysis

Table 17
Overview of PRISMA auction processes

Capacity allocation processes
Two auction mechanisms are used on PRISMA. Annual, quarterly and monthly capacity products are offered in multi-stage ascending price auctions, while day-ahead capacity is marketed in continuous one-stage auctions that can be concluded more quickly.

Multi-stage ascending price auctions
Multi-stage ascending price auctions comprise a series of rounds. Bids are made for capacity at a set price and these are published for all bidders to see after each round. The auction lasts as long as it takes for demand from bidders to match the capacity offered. In the first round, bidding begins at the reserve price; bidders must join the auction in the first round and it is not possible to join at a later stage. If demand in the first round is equal to or less than the capacity on offer, the auction ends and the starting price is determined as the clearing price. If demand in the first round is greater than the capacity on offer, the price is raised and a new bidding round opens. In each subsequent round, the price is increased in large steps by the platform. The size of the steps for different products and countries can vary (e.g. annual auctions: 10 cents

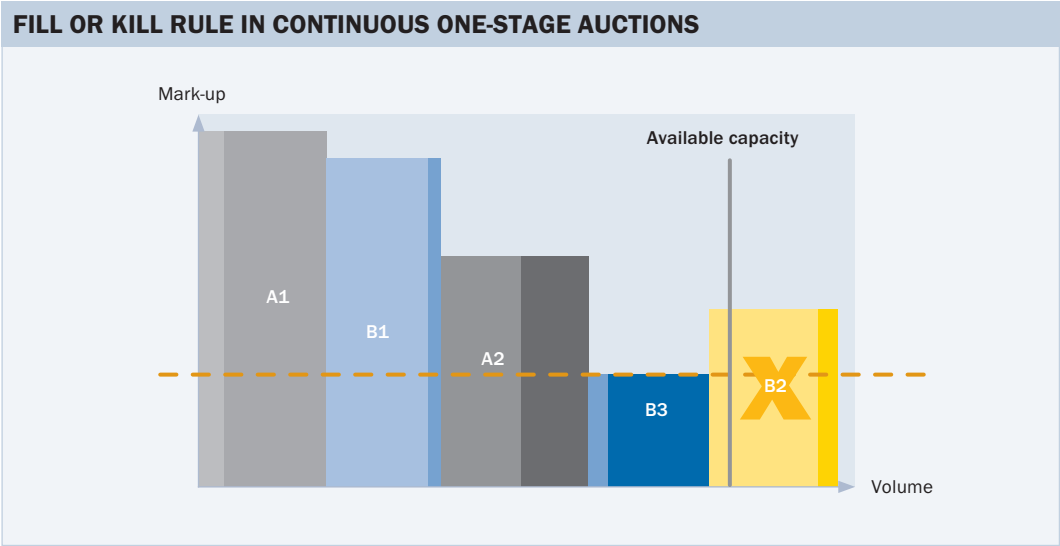
per kWh/h; quarterly auctions: 2.5 cents per kWh/h; monthly auctions: 1 cent per kWh/h). Bidders are only permitted to reduce the amount of capacity they bid for from one round to the next; increases are not allowed. If a competing product is available, bidders are notified of and able to see possible bids for the competing product submitted by another PRISMA user from the same organisation.

Bidders are able to change or withdraw their bids for as long as a bidding round remains open. Rounds usually last one hour, with the exception of the first round, which lasts for three hours. If a round opens in which demand for capacity is lower than the supply due to a price increase that is too high, the previous round is repeated with a smaller price increase (one-fifth of the large step previously applied) and new bids. In this first round with the reduced price step, bids may not exceed those submitted in the last "regular" round (i.e. before the round in which demand was lower than the capacity available). If demand in this new round is still lower than the capacity on offer, the previous price – from the round in which demand was initially too low – is fixed as the clearing price and the auction ends.

Continuous one-stage auctions

Continuous one-stage auctions consist of only one round, in which each system user can place up to ten separate bids. The bids made show the demand curve for each system user. Users specify the minimum and maximum capacity they are willing to purchase at their bid prices, which must always be higher than the reserve price. Each bid must contain a minimum capacity that is within the total capacity on offer. After the bidding round has ended, PRISMA ranks the bids in order of price offered (highest price first), and the price offered in the bid to which the last available capacity is allocated determines the clearance price. This price applies to all successful bids. Bids at prices that are too low are disregarded.

The fill or kill rule is applied in one-stage auctions, coming in to play to decide the last bid that will be accepted. If the minimum capacity specified in the last bid is greater than the remaining available capacity, the bid is excluded from the successful bids (killed). If the minimum capacity specified in the bid is less than the remaining available capacity, the bidder is awarded the remaining capacity, even if the amount of capacity exceeds the total capacity specified in the bid (the bid is filled). Where the bid is excluded, the next highest ranked bid is awarded the capacity, provided that the minimum capacity submitted is less than that of the "killed" bid and the remaining available capacity. The price offered in this bid then applies to all other bids. Chart 50 illustrates this situation. The second bid made by bidder B (B2) is excluded, since the minimum capacity specified (grey line) is greater than the remaining available capacity. But because the minimum capacity entered in B's third bid (B3) is less than the remaining capacity, B is awarded the remaining capacity, despite



Source: PRISMA, E-Control analysis

Chart 50
Fill or kill rule in continuous one-stage auctions

the fact that the price submitted in the bid is lower than the price in bid B2. Since the last remaining capacity is awarded to B3, the price specified in that bid becomes the clearing price for all successful bids (A1, B1, A2 and B3).

If the last two bids are equally high, the pro rata principle is applied: the remaining capacity is divided between them equally, provided that the minimum capacities specified are within the remaining available capacity.

First come, first served
Shippers can still book capacity at certain IPs[44] on a first come, first served basis. For this option, PRISMA acts as an intermediary, supplying the system operator with all of the relevant information about the shipper. The regulated tariff determines the price for first come, first served transactions. The shipper makes an enquiry to the system operator via PRISMA to ask whether a certain amount of capacity is available at the specified tariff. If the capacity is available, the system operator must sell that capacity to the shipper, in accordance with the first come, first served principle. If no free capacity is available, the system operator may offer the shipper other products.

Unused capacity
The EU has adopted Congestion Management Procedures (EU CMP) to deal with the problem

[44] Mainly German IPs

of reserved capacity that remains unused. These rules are set down in point 2.2 of Annex I to Regulation (EC) No 715/2009, and were implemented on 1 October 2013. They are intended to reduce contractual congestion, which is defined in Art. 2(1) of the Regulation as "a situation where the level of firm capacity demand exceeds the technical capacity." In comparison, physical congestion is defined in the same Article as "a situation where the level of demand for actual deliveries exceeds the technical capacity at some point in time."

In essence, the EU CMP come into effect when all available technical capacity at an IP has already been allocated, to prevent capacity hoarding and support efficient use of capacity. The principles used for assigning this capacity are decided by the respective regulatory authority in consultation with the TSOs. The measures to combat contractual congestion included in Annex I to Regulation (EC) No 715/2009 are an oversubscription and buy back (OS&BB) regime, a firm day-ahead use-it-or-lose-it (FDA UIOLI) mechanism, a system for the surrender of capacity and a long-term UIOLI mechanism.

E-Control agreed the introduction of the FDA UIOLI mechanism with Austrian TSOs Baumgarten-Oberkappel Gasleitungsges. m.b.H (BOG), Gas Connect Austria (GCA) and Trans Austria Gasleitung GmbH (TAG).[45] This means that for the time being, an incentive-based OS&BB scheme will not be applied in Austria. The TSOs are conducting an evaluation of OS&BB, which is due for completion by 1 October 2014.

FDA UIOLI must be implemented at all IPs that are subject to an extended period of congestion.[46] At these IPs, UIOLI is only applied to capacity that has been reserved and initially nominated by a system user, but has not been nominated for the following day. The mechanism allows this foreseeably unused capacity to be offered to other users at short notice. The original system user is permitted to re-nominate the amount of contracted capacity, depending on how much of the reserved capacity was initially nominated. In order to protect smaller system users, the mechanism is only applied when a user has been assigned more than 10% of an IP's technical capacity.

ACER has published the first Contractual Congestion Report, covering the fourth quarter of 2013. It identifies and analyses instances of contractual congestion at European IPs, and the measures adopted in response at each IP. Congestion can have an impact on auctions by causing an auction to result in a mark-up on the reserve price, or if no capacity can be offered at auction because capacity is fully booked. In Q4 2013, contractual congestion of at least one month was identified for 188 directions of flow from various hubs, according to data from ENTSOG, PRISMA auctions and a survey of TSOs.[47]

[45] Decision of the E-Control Executive Board on an oversubscription and buy-back regime, 17 September 2013 http://www.e-control.at/portal/page/portal/medienbibliothek/recht/dokumente/pdfs/Ueberbuchungs-und-Rueckkaufsystem.pdf
[46] For further details, see Regulation (EC) 715/2009, Annex I, point 2.2.3(1).

Secondary market

Since 1 January PRISMA has hosted a secondary market that allows users to sell on reserved capacity if it is not needed. This will gradually replace all existing secondary market platforms. Shippers registered on PRISMA's primary market are not required to register separately for the secondary market. Users can offer capacity for sale or provide details of the amount of capacity they wish to buy. Trades can be carried out 24 hours a day, 365 days a year. Depending on the trading procedure, sellers specify the runtime, amount and price of the capacity they are offering. It is possible to buy only a part of the capacity (either in terms of volume or time), if the seller offers this option.

There are three different procedures that can be used to trade capacity on the PRISMA secondary market: over the counter (OTC), first come, first served (FCFS) or call for orders (CFO) (an overview is provided in Table 18).

In OTC trades, a user offers a specified amount of capacity to one or more buyers. If another user accepts the offer, the price and conditions are agreed between the two parties outside the PRISMA platform. However, conclusion of the contract takes place on PRISMA, when the buyer submits a request and the seller accepts it. For FCFS trades, conditions are set in advance by the party submitting the trade proposal, and trading partners are allocated by PRISMA. If the specified conditions are accepted, the contract is automatically concluded, without the need for confirmation from the proposer of the trade. In contrast to OTC transactions, under the FCFS procedure trading partners remain anonymous until the transaction is completed on PRISMA.

The CFO procedure is distinguished by the fact that the price stated in the proposal submitted on PRISMA is not a fixed price, as is the case for FCFS trades, but represents the maximum price a buyer is willing to pay or the minimum price a seller is willing to accept, depending on the type of proposal. The party that created the trade proposal can collect anonymous requests/offers and decide which

FEATURES OF SECONDARY MARKET TRADING PROCEDURES ON PRISMA

Procedure	Trading partner	Price	Capacity	Allocation of trading partners
OTC	Known	Negotiated	Fixed	Confirmation
FCFS	Anonymous	Fixed	Fixed	Automatic
CFO	Anonymous	Upper/lower limit	Proposal includes maximum capacity	Selection

Source: PRISMA, E-Control analysis

Table 18
Features of secondary market trading procedures on PRISMA

[47] ACER (2014), ACER annual report on contractual congestion at interconnection points, Period covered: Q4 2013, first edition

to accept at the end of the process. Because parties remain anonymous until the contract is concluded, it is not possible to conduct negotiations.

When a transaction is confirmed, the system operator has to accept the new shipper via PRISMA. Once this has been done, the new shipper pays the auction price directly to the gas system operator and must pay any mark-up on the price to the other system user in order to complete the purchase. If the original shipper had acquired unbundled entry and exit capacity at the same IP, it may sell this as bundled capacity on the secondary market.

In January 2014 – the first month after the PRISMA secondary market went online – a total of five transactions were concluded. In three of the transactions, capacity of 1.15 GWh/h for one month was successfully transferred, and in the other two capacity of 0.84 GWh/h for two months was transferred.[48]

The next section will look at prices and price correlation at European gas hubs. Prices are an important consideration in an analysis of gas transmission markets because price spreads should correlate directly with the results of auctions for transportation capacity. For this reason, the gas prices at individual hubs are analysed and compared in this part of the report. When there are price differences between individual markets, shippers are able to take advantage of arbitrage trades: buying gas in one market, transporting it to another one and selling it there at a higher price. The analysis will also compare the Austrian CEGH with more liquid European trading hubs, namely GPL and NCG (both in Germany), TTF (Netherlands), PSV (Italy), NBP (UK) and PEG Nord and Sud (both in France).

Correlation between hub prices

To obtain an overview of the evolution of European gas prices, a correlation analysis was used to shed light on the level of integration between individual market areas. The correlation coefficients presented in Table 19 show that price correlation between the various hubs in Europe was very high between 2010 and 2013. Only prices at the PSV hub in Italy show very low or insignificant correlation with prices at all others. This can be attributed to the PSV's low liquidity.[49] In the past, congestion at Arnoldstein has led to higher prices in Italy and in turn to lower correlation with prices at other hubs in Europe. This can also be seen to a certain extent in Chart 51, which illustrates the significant deviation in prices at the PSV hub. However, the PSV prices also show a converging trend over the time period. In contrast, price differentials between the NCG, PEG Nord and TTF hubs were almost non-existent from the beginning of the period onwards, as can be seen from the correlation coefficients,

[48] PRISMA press release: "Successful first month of operations of PRISMAs new secondary market functionality", 18 February 2014
[49] Petrovic, B. (2013): „European gas hubs: how strong is price correlation?". Institute for Energy Studies, University of Oxford, NG 79

which are close to 1. It should be noted that the direction of causality cannot be derived from the correlation analysis; in other words, this analysis does not identify which hub is determining prices and which hub is simply importing prices.

CORRELATION OF GAS PRICES AT EUROPEAN HUBS, 2010-2013

	NBP	TTF	PSV	GPL	NCG	PEGNord	PEGSud
CEGH	0.907	0.954	0.160	0.956	0.957	0.949	0.891
PEGSud	0.917	0.925	0.109	0.923	0.924	0.925	
PEGNord	0.978	0.996	0.208	0.990	0.996		
NCG	0.977	0.999	0.185	0.993			
GPL	0.972	0.993	0.117				
PSV	0.110	0.181					
TTF	0.979						

Source: Heren, E-Control analysis

Table 19
Correlation of gas prices at European hubs, 2010-2013

Looking at the change in price correlation over the three years illustrated in Chart 51, no clear convergence emerges between 2010 and 2013, with the exception of correlation at the PSV hub. In 2010, all hubs had high correlation coefficients, but these declined for the NBP, CEGH, PEG Sud and in some cases also for the GPL hub, meaning that price divergence can be seen between some hubs when comparing 2010 with 2011. Chart 51 also illustrates the strong correlation between prices at the NCG, PEG Nord and TTF hubs, as shown in Table 19. This is in contrast to the picture for PEG Sud where a trend towards price divergence can be seen over the observation period, starting from a high level of correlation in 2010. Prices at the CEGH also do not show clear signs of convergence with prices at other hubs over this period. A study by Petrovic (2013)[50] that examined a different time period produced contrasting results. Looking at OTC and exchange prices from 2007 to 2010, Petrovic identified high and increasing correlation between European gas prices. The better the physical connection between two hubs, the higher the correlation was. This explains the increasing convergence of prices at the PSV, since during the period under observation, open access measures were introduced, improving physical connections with other hubs.

[50] Petrovic, B. (2013): "European gas hubs: how strong is price correlation?" Institute for Energy Studies, University of Oxford, NG 79

CORRELATION BETWEEN OTC GAS PRICES AT EUROPEAN TRADING HUBS, 2010-2013

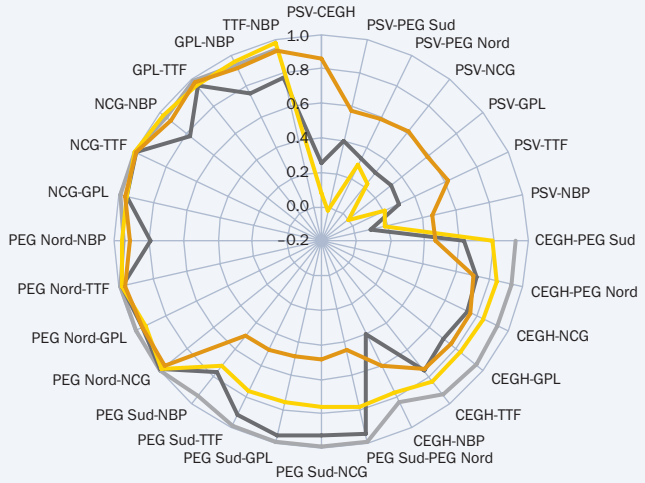


Chart 51
Correlation between OTC gas prices at European trading hubs, 2010-2013

Notes: Prices in sterling at the NBP hub were converted into euros using the daily exchange rate published by the Oesterreichische Nationalbank. No data for the PSV hub were available for 2010.

Source: Heren, E-Control analysis

If prices are compared over periods of less than one year, the correlation between the price time series at the various hubs is not as clear as when they are compared on an annual basis. Chart 52 shows price correlation by quarter, and reveals a seasonal variation in the correlation between prices at the CEGH and others. This analysis does not include the PEG Nord, GPL and TTF markets: seasonal variations in the correlation coefficients for the NCG are representative of the variation at those hubs, due to the high level of price correlation between them and the NCG. Correlation seems to decline from the second to the third quarter in comparison with levels in the fourth quarter and the first quarter of the following year. Price correlation between the CEGH and the other gas hubs clearly rises from the first quarter of 2012 onwards. Prices at PEG Nord, NCG, GPL and TTF correlate strongly over shorter periods, showing the same trend as prices at the CEGH. There is little evidence of seasonal trends at these hubs.

If shorter intervals are considered, an analysis of data for individual months reduces the discernible correlation in comparison to the annual and quarterly analyses. This is due to the fact that both outliers and seasonal

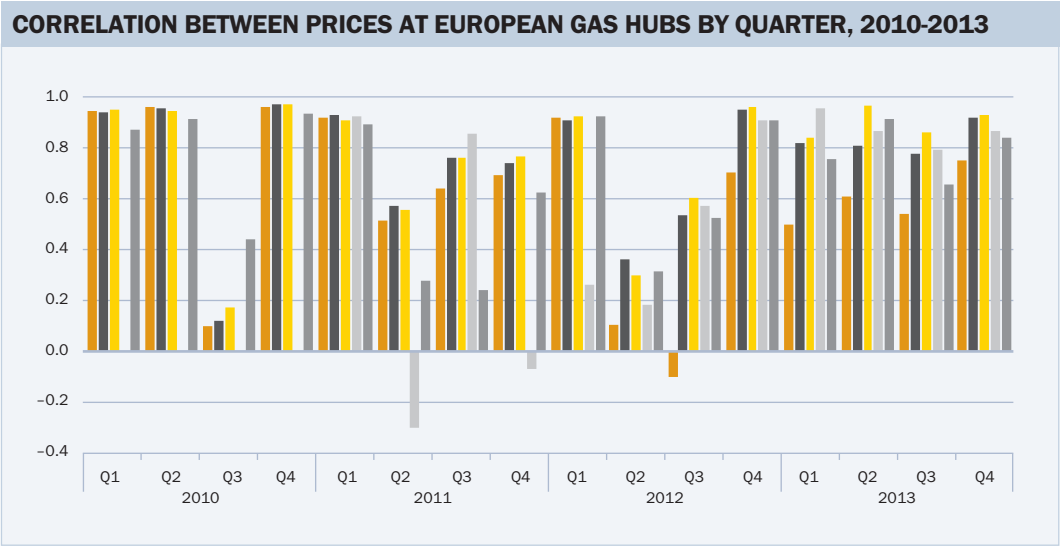


Chart 52
Correlation between prices at European gas hubs by quarter, 2010-2013

Notes: Prices in sterling at the NBP hub were converted into euros using the daily exchange rate published by the Oesterreichische Nationalbank. No data for the PSV hub was available for 2010.

Source: Heren, E-Control analysis

variations have stronger effects in a monthly analysis. As with the picture provided by quarterly data, correlation is generally far lower in the summer months than during the winter months. In June 2012, price correlation was actually negative.

Price spreads between European gas hubs
The correlation between prices at different trading hubs is not as important in an analysis of transportation capacity as the actual differences between the prices determined at the individual hubs. Examination of price spreads between hubs can reveal potential opportunities for arbitrage trading, which shippers are likely to include in their economic analysis of transport capacities. Table 20 shows the differences between prices at the Austrian CEGH and other European gas hubs. The price spreads were calculated by subtracting the prices at the other hubs from the CEGH price – negative values indicate that gas was cheaper at the CEGH, and positive values mean prices were lower at the other hub over the period.

The table shows that the highest average price differential in the 2010-2013 period was between the Austrian CEGH and the PSV hub in Italy. On average, prices on the

PSV market were 8% higher than at the CEGH. The largest difference was recorded in February 2012, when prices paid at PSV were up to 55% or EUR 35.75/MWh higher. Over the three years as a whole, gas traded at PEG Nord in France, TTF in the Netherlands, NCG and GPL in Germany and especially at the UK's NBP hub was cheaper than at the CEGH. However, these differences in prices were for the most part less dramatic than the price spread between the CEGH and PSV. The biggest positive price difference in absolute terms was recorded at the French PEG Sud hub – although prices were on average slightly higher, in September 2011 gas could be purchased for about half of the CEGH price. Only the price spread between the CEGH and the NBP reached a higher level in percentage terms. Generally speaking, gas price spreads between the CEGH and PEG Sud were the most volatile.

The price spreads illustrated in Chart 53 moved in step up to the end of 2012, with the exception of the PSV hub in Italy. From mid-2011 to mid-2012 the spread between PSV and the other hubs was extremely high. By contrast, apart from a brief period in early 2013, OTC prices at the NBP, TTF, GPL, NCG and PEG Nord hubs were consistently lower than those at the CEGH. These spreads never exceeded EUR 4/MWh, with the exception of the NBP price, which deviated more widely from prices at the CEGH. At the beginning of 2012, price spreads between the CEGH and PEG Sud began to diverge from the other spreads analysed, as PEG Sud prices rose more quickly than OTC prices at the CEGH. It is clear that there is still potential for harmonisation of gas prices across Europe.

PRICE SPREADS BETWEEN THE CEGH AND OTHER EUROPEAN GAS HUBS, 2010-2013

Hub	Unit	Mean	Standard deviation	Maximum	Minimum
PEG Sud	EUR/MWh (%)	–0.61 –1%	2.81 10%	8.1 51%	–15.81 –36%
PEG Nord	EUR/MWh (%)	0.7 4%	1.41 6%	5.81 32%	–9.1 –23%
NCG	EUR/MWh (%)	0.8 4%	1.28 6%	8.38 30%	–8.35 –23%
GPL	EUR/MWh (%)	0.83 4%	1.26 6%	7.25 43%	–8.1 –23%
PSV	EUR/MWh (%)	–2.49 –8%	2.99 9%	1.65 5%	–35.75 –55%
TTF	EUR/MWh (%)	0.98 5%	1.29 6%	6.11 33%	–9.24 –23%
NBP	EUR/MWh (%)	1.12 6%	2 10%	7.65 56%	–12.12 –29%

Table 20
Price spreads between European gas hubs

Source: Heren, E-Control analysis

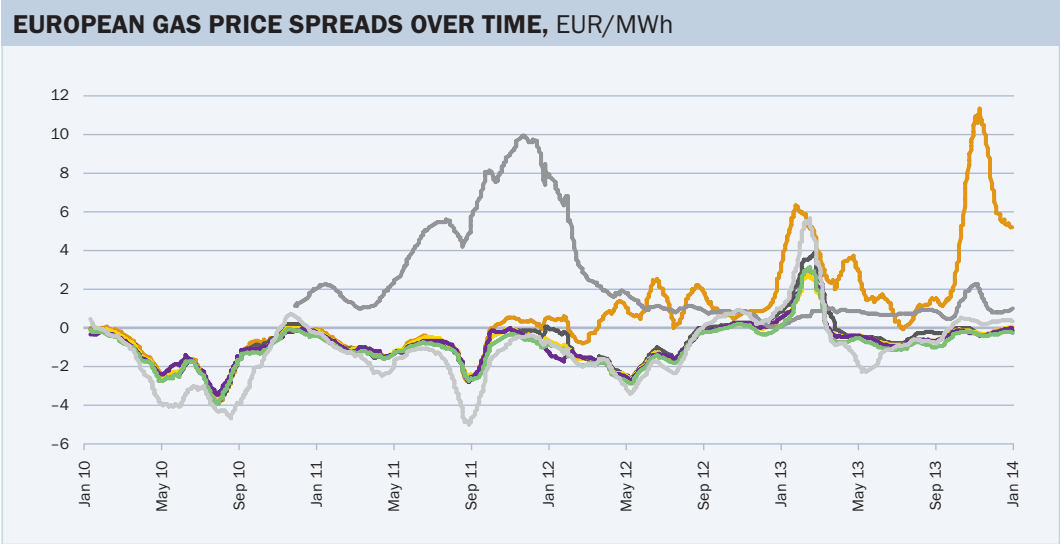


Chart 53
OTC price spreads between the CEGH and other European gas hubs, 2010-2013, 30-day average, EUR/MWh

Source: Heren, E-Control analysis

Overall, the results of the price spread analysis show that there are definitely price differentials between the European hubs included in the study, meaning there are arbitrage opportunities for shippers trading gas between markets. But in order to determine whether it is actually profitable to purchase gas at a lower price in one market and sell it at a higher price in another, the costs of transporting the gas between the different markets must be subtracted from the profit made in the arbitrage transaction. Tariffs for the use of transmission pipelines, which are payable when gas is transported out of one market and into a different pipeline system, may account for a substantial proportion of the costs. These entry-exit tariffs must also be taken into account alongside auction outcomes and price spreads.

Empirical analysis of auction results
40,715 auctions were conducted on PRISMA from April 2013 to January 2014, of which 5,819 were successfully concluded. Of the 84,490 GWh/h offered, only 2.8 GWh/h was auctioned off.[51] At present 1,086 registered users from 356 companies can participate in auctions on PRISMA.[52]

Table 21 shows the percentage of total capacity offered at Austrian IPs that was successfully auctioned on the PRISMA platform. By far the highest proportion of Austrian capacity was marketed at Oberkappel (with an annual average of close to 14%) and Baumgarten (with an average of around 11%). Nevertheless, the level of successful auctions is extremely low, which could be due to a number of factors. The narrow price spreads between European trading hubs illustrated

[51] Figures include day-ahead, month-ahead, quarter-ahead and year-ahead data.
[52] Status: March 2014

above and the accompanying decline in opportunities for arbitrage trading may have had a significant impact on the low rates presented in Table 21. The higher proportions of marketed capacity at Oberkappel and Baumgarten could be explained by their roles as key transit hubs. However, this argument breaks down when we consider the low rate of auctioned capacity at Arnoldstein, which is also a major transit point.

Taking into account the number of auctions concluded where a mark-up was paid (see Table 22) as well as the proportion of capacity auctioned, this conclusion can more or less be excluded. A mark-up is paid when a shipper is willing to pay more than the reserve price (which usually corresponds to the entry-exit tariff). In Austria, only auctions of capacity at Arnoldstein, Oberkappel and Überackern resulted in mark-ups, and there were only a few such auctions. In auctions of capacity at Arnoldstein, mark-ups were only achieved on sales of bundled capacity; for capacity at Oberkappel, mark-ups were mainly paid at auctions of bundled capacity, and in the case of Überackern, only auctions of non-bundled capacity resulted in a mark-up. However, bundled products have only been offered at Überackern since 1 April 2014 and so were not included in this analysis. The majority of auctions that resulted in a mark-up on the reserve price were of Austrian day-ahead capacity.

PROPORTION OF TOTAL AUSTRIAN CAPACITY OFFERED ON PRISMA SUCCESSFULLY MARKETED IN 2013, %

	Baumgarten	Arnoldstein	Mosonmagyarovar	Murfeld	Oberkappel	Überackern
February	–	–	–	–	16.24 %	0.00 %
March	–	–	–	–	37.73 %	3.07 %
April	7.27 %	0.45 %	0.00 %	0.06 %	8.05 %	3.08 %
May	2.74 %	0.00 %	0.14 %	0.15 %	11.54 %	4.74 %
June	4.89 %	0.00 %	2.04 %	0.11 %	7.02 %	4.61 %
July	6.80 %	0.00 %	3.16 %	0.21 %	43.80 %	0.22 %
August	4.86 %	0.00 %	3.78 %	0.09 %	36.13 %	4.43 %
September	11.58 %	0.00 %	4.38 %	0.47 %	11.80 %	3.53 %
October	22.13 %	0.55 %	4.02 %	2.58 %	26.80 %	5.65 %
November	20.45 %	2.64 %	4.06 %	3.91 %	0.54 %	2.86 %
December	13.81 %	9.98 %	4.28 %	3.43 %	11.26 %	5.50 %
January 2014	14.32 %	1.19 %	2.20 %	2.59 %	0.04 %	5.95 %
Average	**11.17 %**	**1.86 %**	**2.93 %**	**1.33 %**	**13.78 %**	**4.02 %**

Source: PRISMA platform, E-Control analysis

Table 21
Proportion of total Austrian capacity offered on PRISMA successfully marketed in 2013

PRICE MARK-UPS AT PRISMA AUCTIONS, APRIL-DECEMBER 2013			
	Arnoldstein	Oberkappel	Überackern
Number of auctions	1,266	1,428	2,597
with mark-up	16	60	10
of which day-ahead (DA)	14	59	10
Ave. DA mark-up (EUR/MWh)	0.59	0.31	0.03
DA product type			
Non-bundled	0	8	10
Bundled	14	51	–

Note: No mark-ups were recorded in auctions of capacity at the Austrian IPs that are not shown.

Source: E-Control analysis based on information publicly available on PRISMA

Table 22
Price mark-ups at PRISMA auctions in 2013

An examination of the cost and price structures at Arnoldstein, Überackern and Oberkappel can give an indication of whether the auction results reflect the fundamental data for these IPs. There is also the question of whether transmission for arbitrage trades is technically possible at the IPs. If pipelines are completely booked up or congested, they cannot be used for additional gas transportation, including for arbitrage purposes. Therefore, in this section, price spreads, tariffs and auction prices will be briefly examined together with the technical capabilities at each IP. These three IPs were selected because mark-ups were paid at PRISMA auctions of their capacity and because they are connected to key markets that are highly relevant for analysis.

The Überackern and Oberkappel interconnectors both link the Austrian market with Germany. Examining the two IPs together is worthwhile because they both connect the CEGH and NCG hubs, meaning they can be used for arbitrage trading between the two. Überackern links the pipelines operated by Austrian TSO Gas Connect Austria with those of German TSO bayernet, while at Oberkappel gas is transferred between BOG and the German TSOs GRTgaz Deutschland and Open Grid Europe.

Charts 54 and 55 each comprise four graphs, with those on the left depicting gas flows from west to east, i.e. from Germany to Austria, and those on the right showing flows from east to west. However, an accurate picture of the direction of flows at Oberkappel and Überackern cannot be determined. This becomes apparent when the entry and exit capacities represented in the lower graphs in Charts 54 and 55 are offset against one another and added up.

CAPACITY AT OBERKAPPEL, EXIT GER/ENTRY AUT, 2013

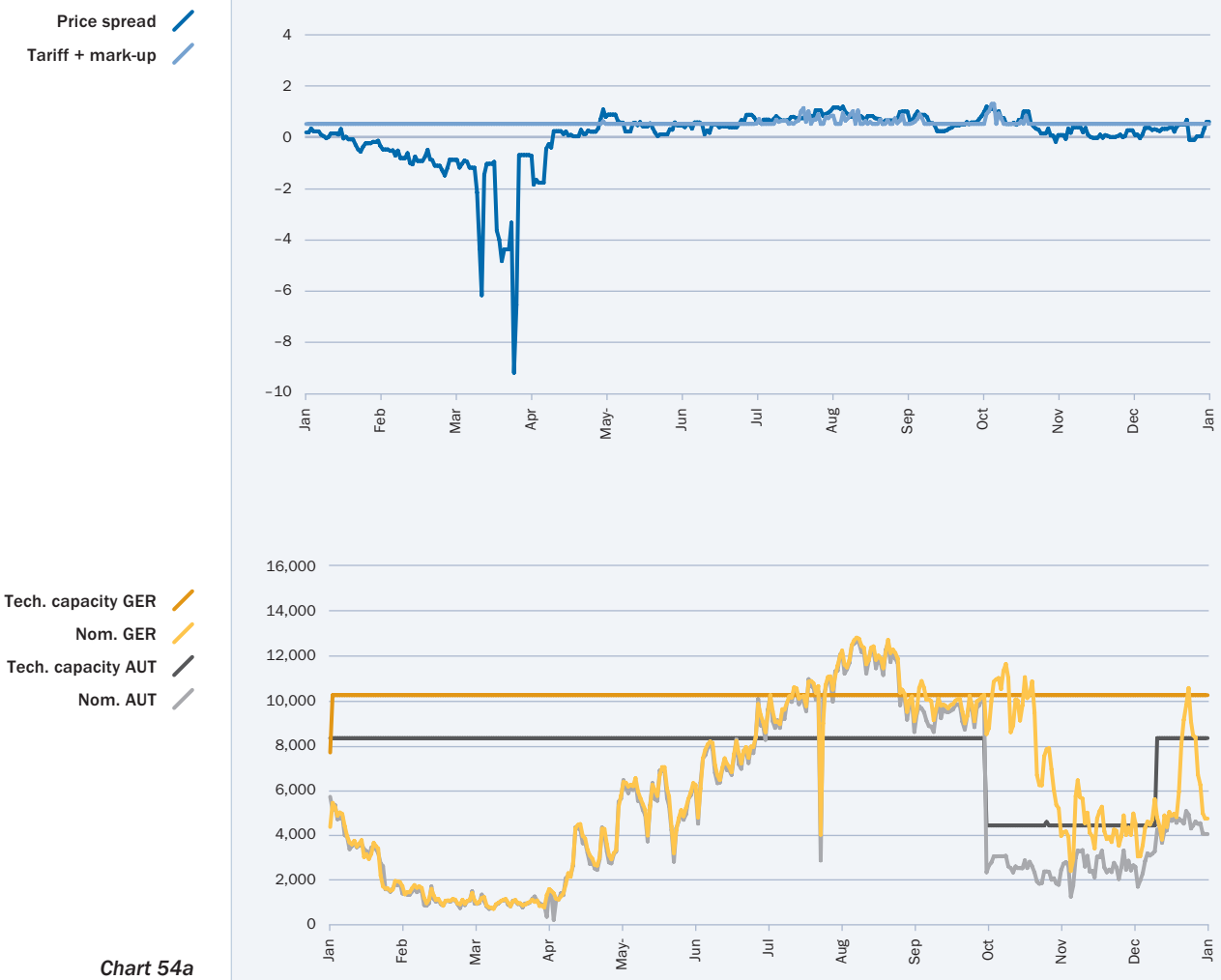


Chart 54a
Capacity at Oberkappel, 2013

Note: The Open Gird Europe (OGE) tariff for freely allocable capacity was used to calculate the price of bundled capacity.

Source: PRISMA, Heren, BOG, GRTgaz Deutschland, OGE, E-Control analysis

CAPACITY AT OBERKAPPEL, EXIT AUT/ENTRY GER, 2013

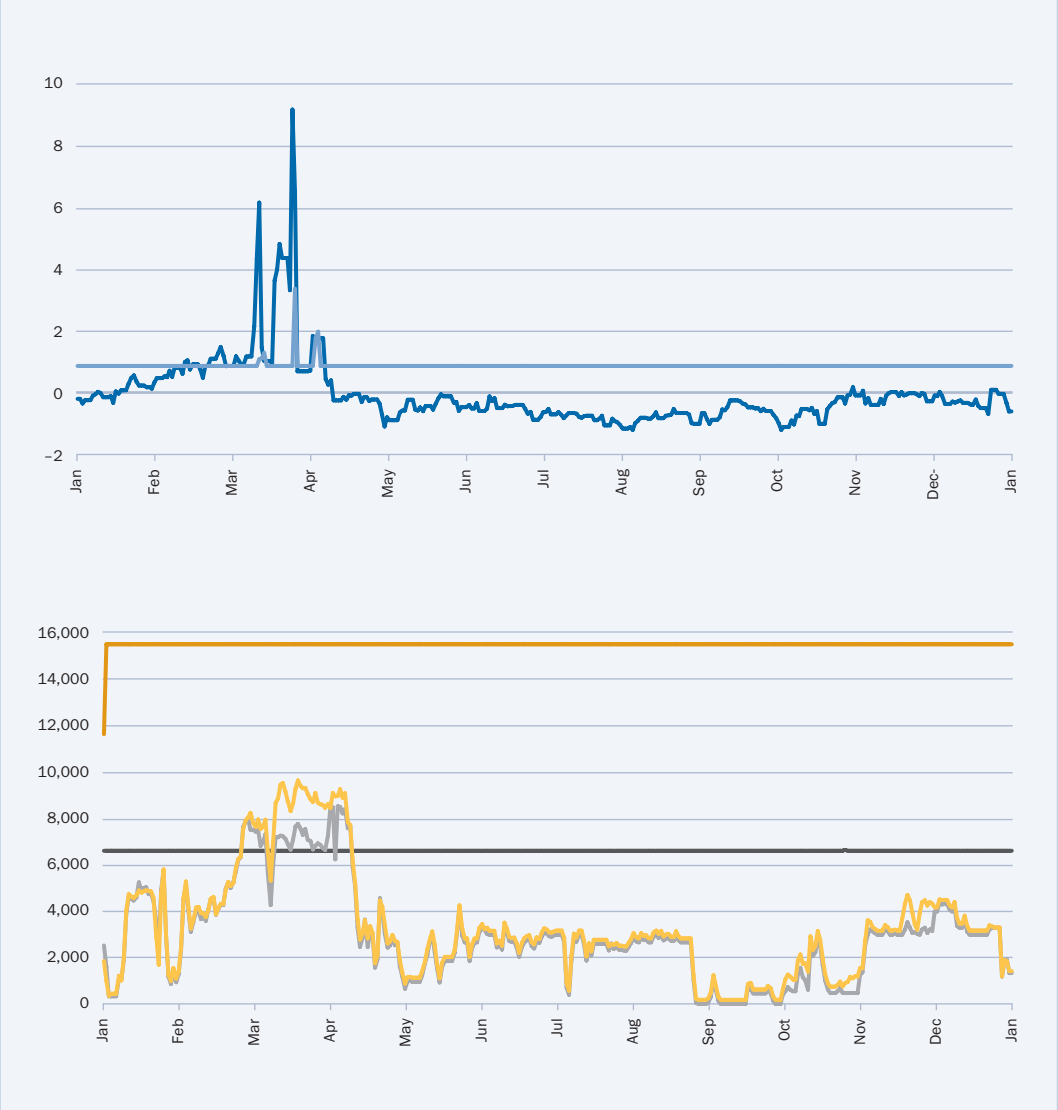


Chart 54b
Capacity at Oberkappel, 2013

Note: The Open Gird Europe (OGE) tariff for freely allocable capacity was used to calculate the price of bundled capacity.

Source: PRISMA, Heren, BOG, GRTgaz Deutschland, OGE, E-Control analysis

Where entry and exit capacities at one of the IPs do not tally with the direction of flow, this is due to the fact that for Oberkappel the final allocation was taken into account and for Überacken renominations were used for data-related reasons. Data are provided by the TSOs, meaning they come from different sources. The figures are intended to highlight the economic aspects of capacity reservation, such as the actual demand at specific times. The net gas flow could also have been used as the basis for analysis. However, net gas flow is ascertained by calculating the difference between the flow from west to east and that from east to west, meaning that the demand in a particular direction cannot be accurately determined. As a result of this method of offsetting contractual capacity reservations, it is possible that allocations and renominations exceed technical capacity at the IP. An instance of this situation, where the amount of firm and interruptible capacity assigned was greater than the technical capacity, was identified at Überackern (as well as elsewhere) in the ACER contractual congestion report.[53]

Alongside the capacity analysis, the upper graphs in Chart 55 show the price spread[54] between the CEGH and NCG hubs over time, as well as the tariff resulting from PRISMA auctions, including any mark-ups. Price spreads were calculated according to the direction of flow, so that where the spread is greater than the tariff, this indicates an arbitrage opportunity. At IPs where more than one TSO operates, the highest tariff for bundled freely allocable capacity (excluding any additional fees or charges) was used. Mark-ups on both bundled and non-bundled capacity sold at auction were included in the tariff calculation.

From the analysis of nominated capacity in Chart 54 it is clear that technical capacity reported by the German and Austrian TSOs for the same IP sometimes differs considerably. This is because the methods used to calculate technical capacity vary from country to country, which makes comparisons of technical capacity at a particular IP more difficult. However, technical capacity is not as important for this analysis as allocations and nominations, which are reported by all TSOs in the same way.

Chart 54a shows that from the beginning of February to mid-April, large volumes of capacity were nominated for gas transportation from Austria to Germany, while in the same period allocations for transportation from west to east reached a very low level. This meant that the direction of flow in the early part of the year was mainly from east to west, and

[53] ACER (2014), ACER annual report on contractual congestion at interconnection points, Period covered: Q4 2013, first edition
[54] A positive spread indicates that prices at the hub to which gas is transported are higher than those at the hub from which it originates.

at Oberkappel shippers took advantage of arbitrage opportunities presented by the high price at the NCG VTP. The price spike in March, which can be seen in Chart 54b, led to high mark-ups at auctions, while high prices at the CEGH in late summer 2013 led to arbitrage activity. Between July and October, auctions of west-to-east capacity resulted in mark-ups. This is reflected in the higher level of allocations in the same period, and a relationship between the allocations, the price spreads and the mark-ups can be seen in the graphs.

At Überackern the flow of gas paints a different picture than at Oberkappel. Comparing price spreads with the nominated capacities in Chart 55, it is apparent that from the beginning of February to mid-April large volumes of capacity were nominated for transit from Germany to Austria, while nominations in the opposite direction were exceptionally low. At the same time, price spreads for shipments from Austria to Germany were high, but allocations were low. This is explained by the fact that gas entering from Germany at Überackern can only proceed from Überacken to Oberkappel via the Penta West pipeline, and must then be transported via the WAG pipeline to the CEGH. The WAG gives priority to entry capacity from Oberkappel, with the consequence that reservations for transportation of entry capacity from Überackern can only be made on an interruptible basis; firm capacity is only bookable from Überackern to Oberkappel. From Oberkappel, gas either leaves the Austrian market area or, provided that capacity is available on the WAG, it can be transported on to Baumgarten. When there is an opportunity for arbitrage trades between Austria and Germany, capacity is nominated at Oberkappel and the WAG becomes fully booked, so there is no capacity available to carry gas entering at Überackern. The congestion on the WAG pipeline system and the priority given to Oberkappel result in anomalous behaviour at Überackern when there are high price spreads. At such times, entry capacity reserved at Überackern leaves Austria again at Oberkappel. This also explains the high levels of nominated west-to-east capacity between February and April. Since prices on the CEGH were higher than on the NCG trading point, less capacity from Germany to Austria was allocated in this period, meaning that the WAG was not booked up and entry capacity from Überackern could be nominated. However, only a few auctions of capacity at Überackern resulted in mark-ups, meaning that no definitive conclusion can be made about the effect of price spreads and nominations on mark-ups for this IP.

CAPACITY AT ÜBERACKEN, EXIT GER/ENTRY AUT, 2013, EUR/MWh

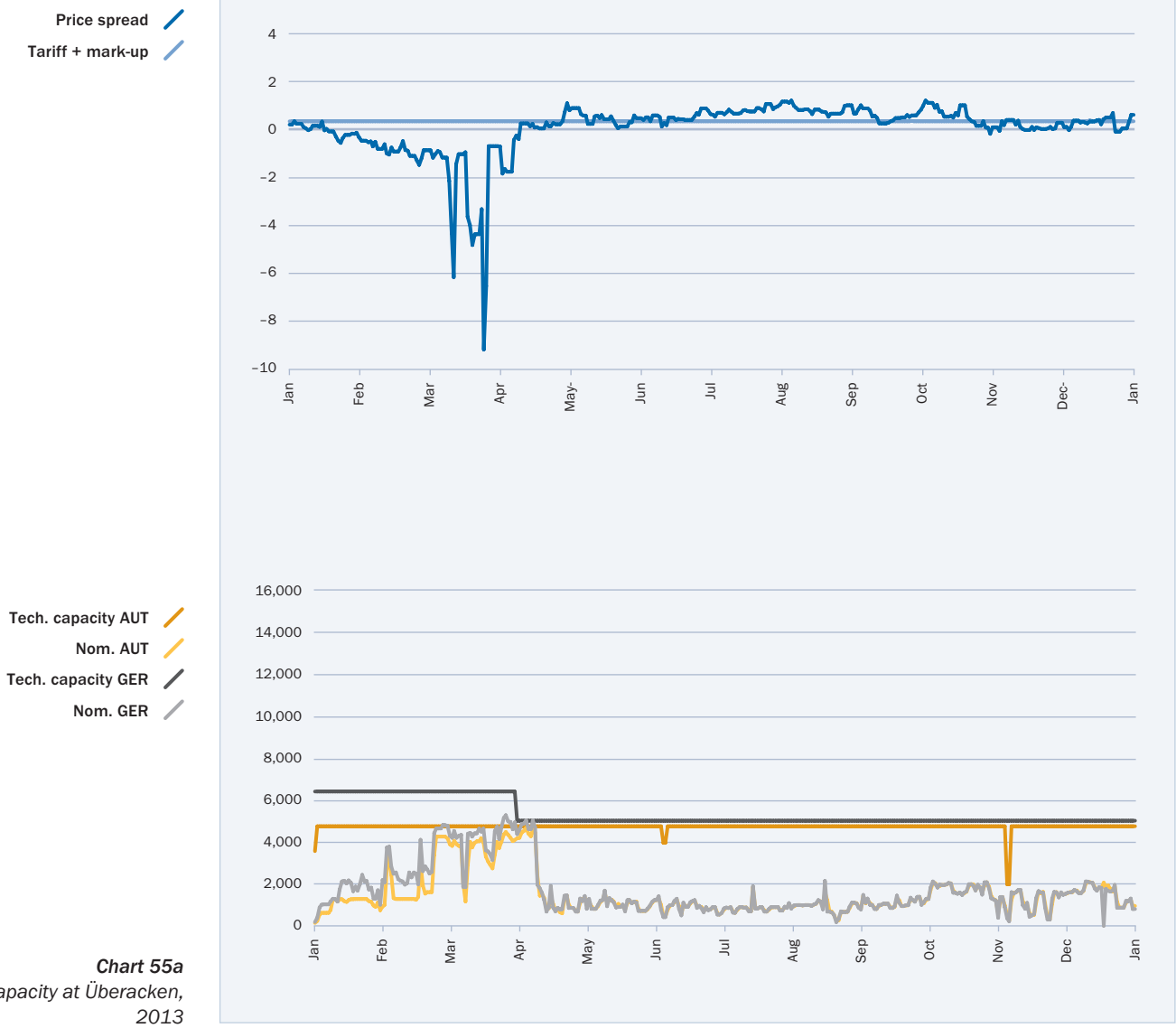


Chart 55a
Capacity at Überacken, 2013

Source: PRISMA, Heren, GCA, bayernets, E-Control analysis

CAPACITY AT ÜBERACKEN, EXIT AUT/ENTRY GER, 2013, EUR/MWh

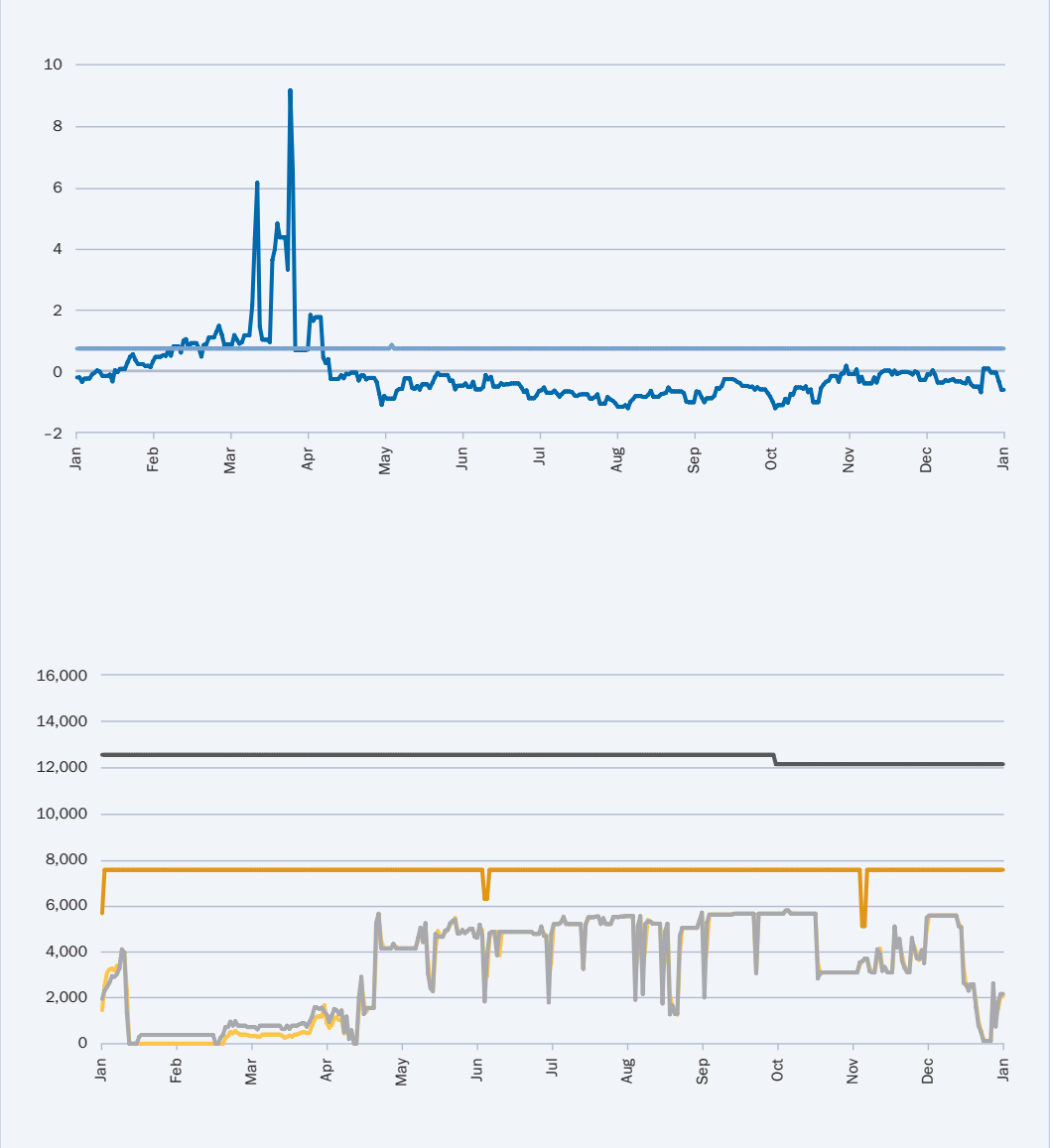


Chart 55b
Capacity at Überacken, 2013

Source: PRISMA, Heren, GCA, bayernets, E-Control analysis

The Arnoldstein IP connects Austria and Italy, linking the CEGH with the PSV hub. Analysing capacity at Arnoldstein is simpler because gas only flows from north to south at this IP. The TSOs that operate at Arnoldstein are TAG for the Austrian market and Snam Rete Gas on the Italian side. In Chart 56, price spreads and the tariff including mark-ups are shown in blue, and technical capacity and allocations in orange and yellow, respectively. With the exception of brief periods, the price spread was lower than the tariff. For a very short time, the price spread was actually negative, meaning that power was more expensive at the CEGH than at the PSV hub. In November, allocated capacity moved from around 25,000 MWh/h to around 40,000 MWh/h. As allocated capacity and the price spread both rose during November, auction mark-ups were also recorded for the first time in 2013.

Overall, it can be concluded that for these three IPs, auction results on PRISMA can be explained with reference to price spreads, tariffs and utilisation. At all three IPs, price mark-ups occur when capacity utilisation and the price spread are so high that arbitrage is a viable option. The mark-up at Oberkappel is almost in line with the price spread, but this is not the case at Arnoldstein. It should be noted that in Italy, tariffs include a volume-based "commodity" component which was not considered in the analysis. The price markup in PRISMA capacity allocation reflects the congestion rent for shippers that would have received capacity under a different mechanism, e.g. on a first come first served basis.

CAPACITY AT ARNOLDSTEIN, EXIT AUT / ENTRY IT, 2013

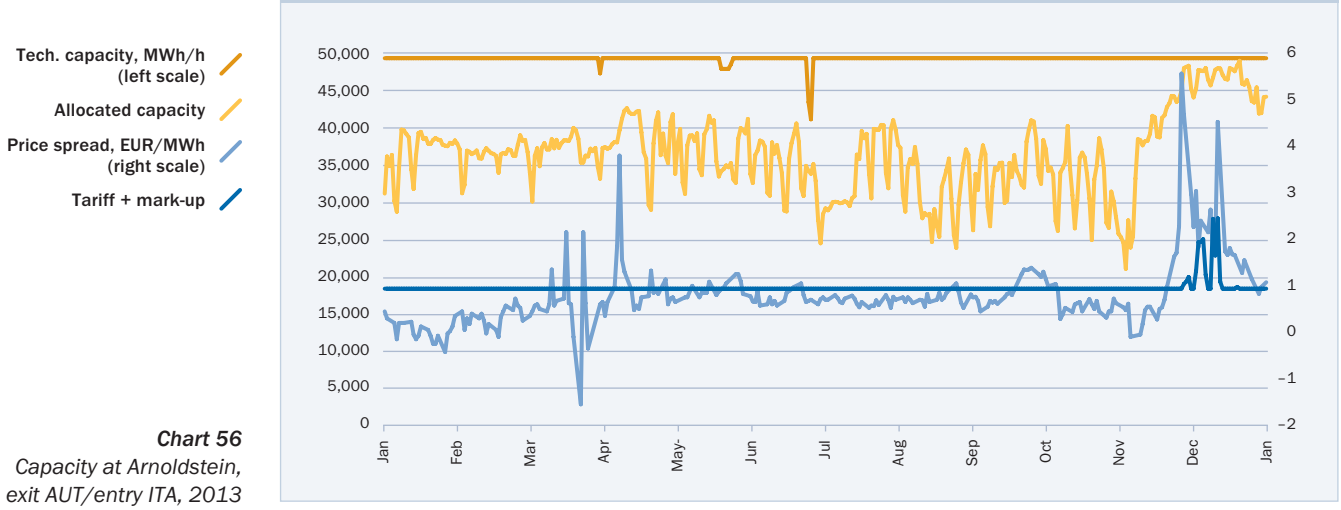


Chart 56
Capacity at Arnoldstein, exit AUT/entry ITA, 2013

Source: PRISMA, Heren, TAG, E-Control analysis

CROSS-BORDER COOPERATION WITH OTHER NATIONAL REGULATORY AUTHORITIES (NRAS) AND PUBLIC AUTHORITIES

Agreements with a number of neighbouring regulatory authorities were reached in 2013.

E-Control is working closely with the German Federal Network Agency on the integration of the Tyrol and Vorarlberg market areas in Austria with the German NetConnect Germany market area. Collaboration on other issues was also agreed, including on network islands, allocation of bundled capacity and congestion management.

A partnership was set up with the Hungarian regulator aimed at coordinating a capacity demand survey at the Mosonmagyarovar IP for physical reverse flow capacity from Hungary to Austria.

An agreement was also reached with the Italian regulatory authority for coordinated implementation of the provisions of the NC CAM and Annex I of Regulation (EC) No 715/2009, in respect of congestion management at the Arnoldstein/Tarvisio interconnector. Cooperation with the Slovenian regulator is focusing on the same issues.

E-Control also participates in the Regulator Advisory Group set up by national authorities that are responsible for regulating TSOs which allocate capacity through the PRISMA platform.

Additionally, E-Control worked together with the Czech regulatory authority on further integration of the gas markets in the CEE region. This involved discussions on implementing a trading region. The Slovakian regulator was also invited to participate, but was unavailable for detailed discussions.

Competition

GAS SUPPLY AND DEMAND

Gas production

Domestic gas production dropped by 5.7 TWh or 28.2% in 2013 to a total of 14.5 TWh. A decline was recorded in every month except March and June, and production in these months was roughly unchanged year on year. The largest falls, each of around 1 TWh or 40%, were recorded in the first two months of the year.

Gas consumption

The downward trend in domestic gas consumption seen over the past few years

continued, with a drop of 4.6% or 4.2 TWh, to 86.9 TWh. A major contributing factor was lower utilisation of gas-fired power plants, which generated a third less electricity than in the previous year, while cogeneration remained at roughly the same level. Chart 57 shows the key components of the natural gas balance over time.

Storage facilities

60.5 TWh was injected into storage facilities in Austria and 68.2 TWh was withdrawn in 2013, for a total of 55.2 TWh of gas in storage at year end – about 8 TWh lower than at the end of 2012. Injection rose by 13.5%, but withdrawals from storage increased by 47.5%.

Imports and exports

Net imports amounted to 67.9 TWh, with physical imports up by 15.0% to 519.3 TWh and exports expanding by 22.4% to reach 451.4 TWh. It was striking that Austria exported significantly more natural gas in the first three months of 2013 than it imported, with an export surplus of 12.7 TWh.

During the year 483.4 TWh of imports entered Austria via Slovakia and 80.7 TWh came from Germany. The majority of exports (317.4 TWh) were to Italy, followed by Germany (68.2 TWh) and Hungary (40.3 TWh). A total of 25.5 TWh was exported to Slovenia, Switzerland and Slovakia.

MONTHLY GAS BALANCE, GWh

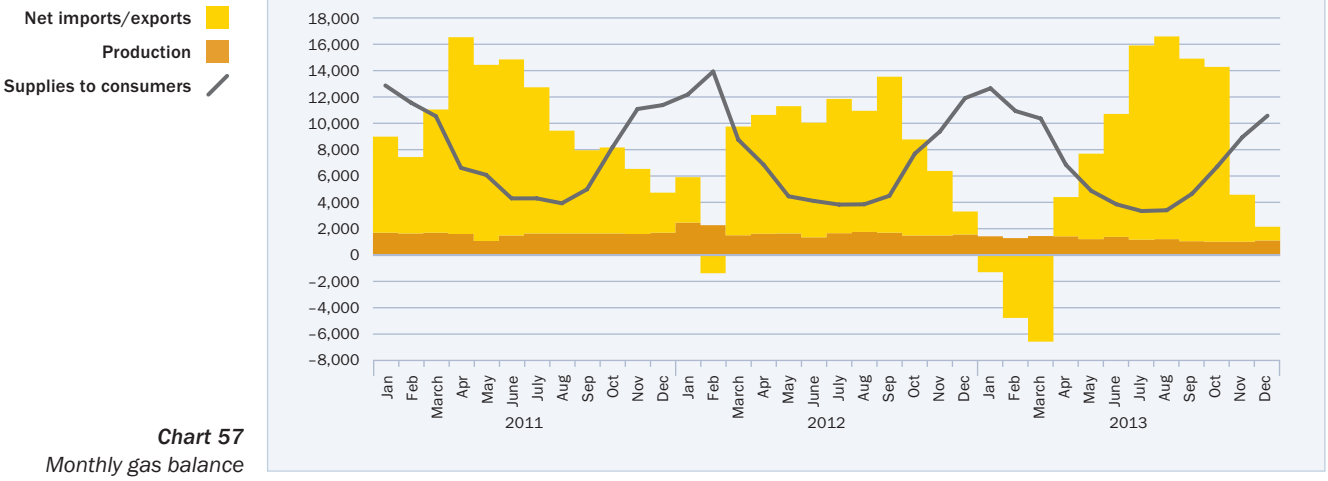


Chart 57
Monthly gas balance

Source: Quarterly, E-Control

COMPETITION ON THE WHOLESALE MARKET

The CEGH Exchange day-ahead price fluctuated only slightly in 2013. The most pronounced shift came in March 2013. As Chart 58 shows, the day-ahead price peaked on 26 March at EUR 35.12/MWh. Prices at all the major European hubs rose at this time, reflecting traders' concerns in the face of low gas reserves and cold temperatures.

The number of members registered to trade on the CEGH OTC market rose during 2013 to reach 161 by the end of the year. In comparison there were 150 registered members at the end of 2012. Of the 161 members registered at the end of 2013, 78 were balance responsible parties and 83 were virtual traders.

Some 35bn cu m of natural gas was traded on the CEGH in 2013. Chart 59 shows that traded volumes were considerably higher in 2012, at 46.8bn cu m. The introduction of the new gas market model on 1 January 2013 may have had a major influence on trading volumes at the beginning of the year. Volumes could have retreated due to uncertainties among market participants concerning the new market model. Trading picked up again during the rest of the year and volumes rose, showing that market participants quickly became accustomed to the new market model.

CEGH EXCHANGE DAY-AHEAD SPOT PRICE, EUR/MWh

Source: CEGH

Chart 58
CEGH Exchange day-ahead spot price, EUR/MWh

TRADING VOLUMES AT THE CEGH, bn cu m

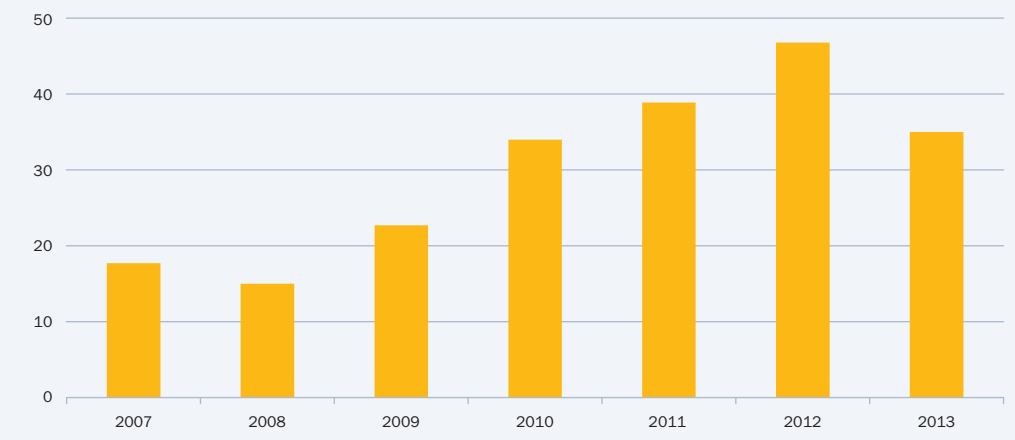


Chart 59
Trading volumes at the CEGH

Source: CEGH

CEGH OTC VOLUMES, 2013, bn cu m

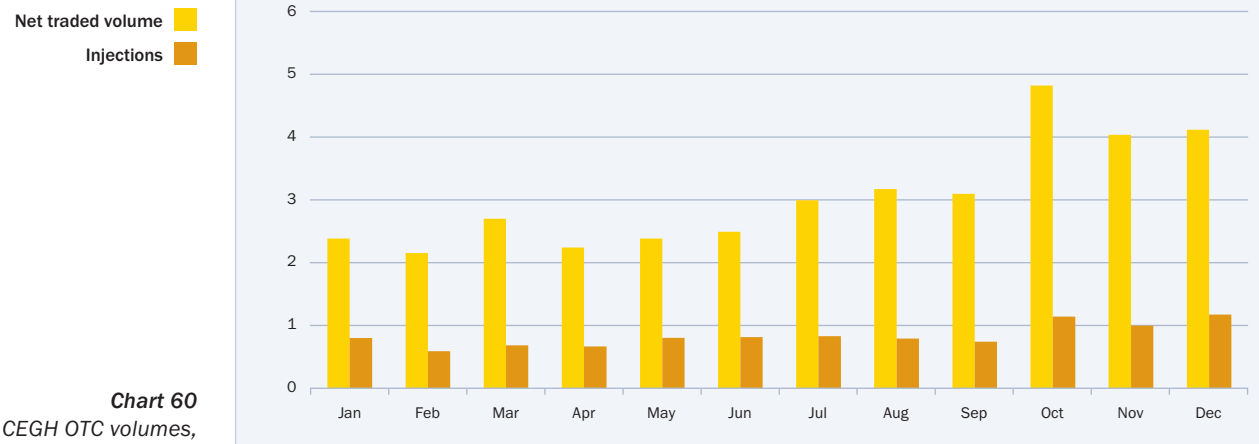


Chart 60
CEGH OTC volumes, 2013

Source: CEGH

As can be seen in Chart 60, OTC volumes traded at the CEGH hit a record of 4.8bn cu m in October 2013. Injections also increased during the year and passed the 1bn cu m per month mark from October to December.

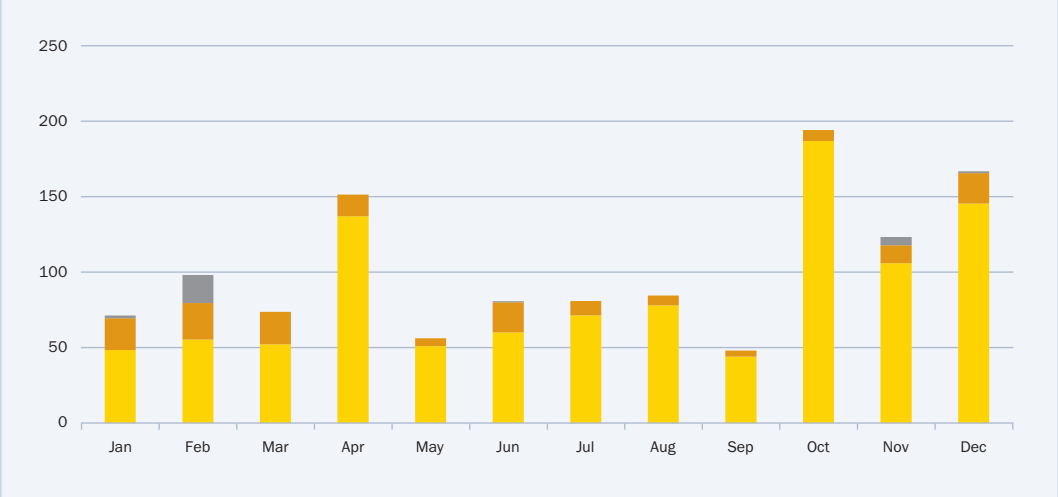
The new gas market model prompted a surge in trading on the exchange. The within-day market was launched to support trading in balancing energy in the eastern market area, and operates 24 hours a day, 365 days a year.

1.23bn cu m was traded on the Vienna Stock Exchange's CEGH Gas Exchange in 2013, almost four times the total trading volume in 2012. Exchange trading is primarily focused on the day-ahead market, although within-day trading occasionally reaches high levels.

A good indicator of the progress made by the CEGH as a trading hub is the bid-ask spread, which is the difference between the quoted selling price (bid) and the buy price. A small spread suggests that adequate numbers of participants are active on the market, and the bid-ask spread on the CEGH narrowed during 2013.

Another reliable indicator of the development of the hub is the churn rate, which shows how many times a cubic metre of gas is traded before it is physically transferred. The average churn rate for gas traded at the CEGH in 2013 was 3.65 – up from 3.53 in 2012. In summary, the new Austrian market model has promoted the growth of liquidity on the market and made trading easier.

CEGH GAS EXCHANGE TRADED VOLUMES, 2013, million cu m



Source: CEGH

Chart 61
CEGH Gas Exchange traded volumes, 2013

CEGH OTC DAY-AHEAD BID-ASK SPREAD, EUR/MWh

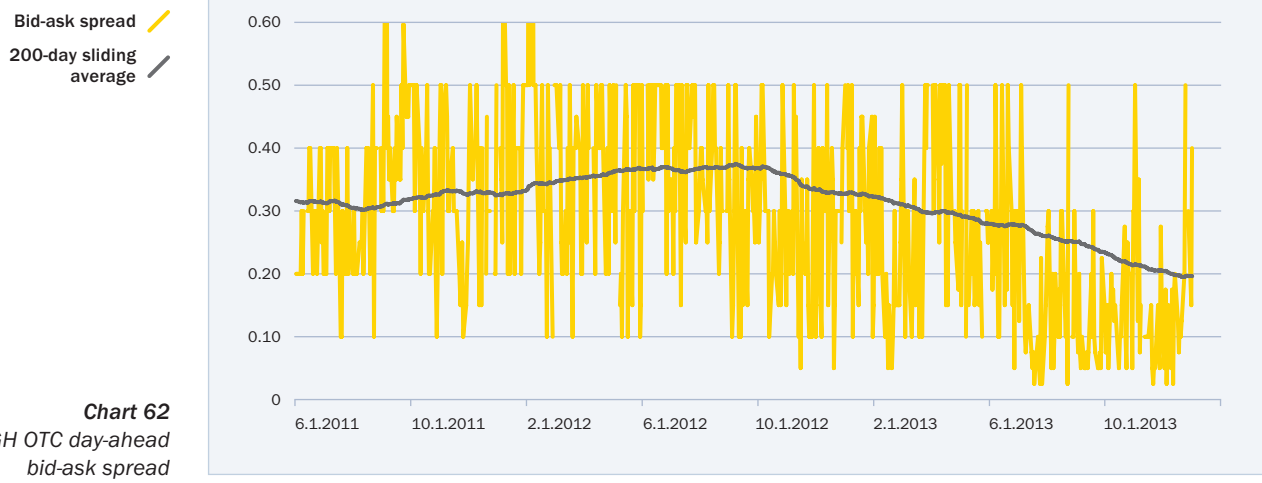


Chart 62
CEGH OTC day-ahead bid-ask spread

Source: E-Control calculations, ICIS Heren

COMPETITION ON THE RETAIL MARKET

The gas retail market can broadly be broken down into two segments:

1. **Mass market consumers** (small consumer market): households, SMEs, farms and other small consumers with an annual gas demand of less than 400,000 kWh. Standard load profiles are assigned to these consumers. The suppliers are legally obliged to publish their prices for this consumer segment.

2. **Individual contract consumer market:** SMEs, large-scale industrial enterprises and service businesses with annual consumption of over 400,000 kWh and metered load. These consumers have individually negotiated agreements with their supplier.

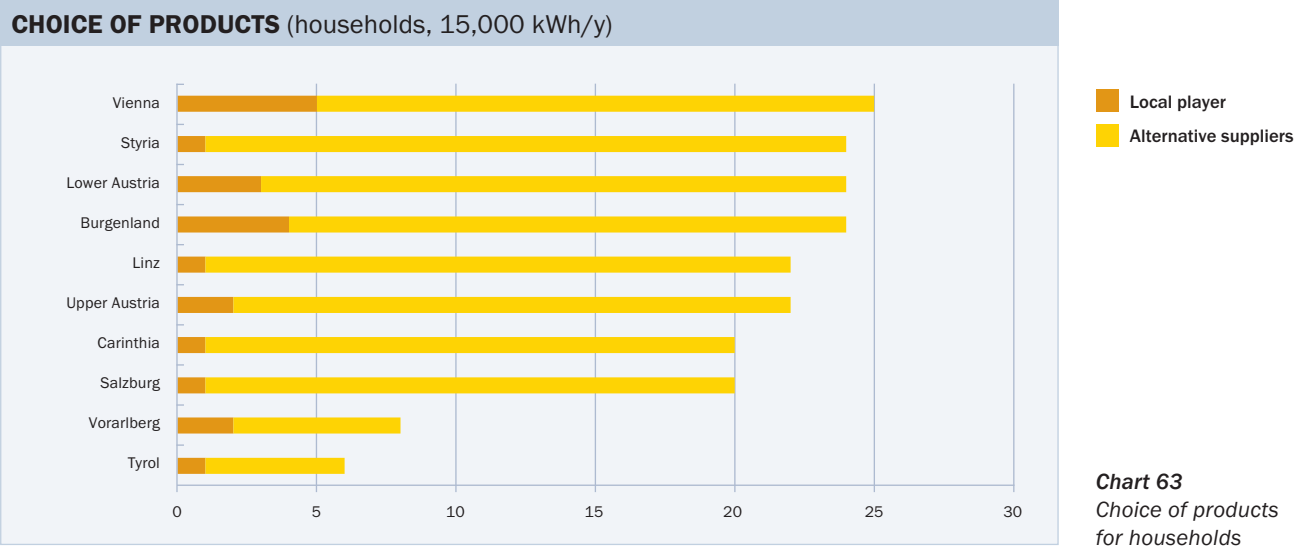
Retail market structure

Supply and demand

Mass market

Gas market competition has increased significantly, especially in the mass market segment.

Four new suppliers entered the market in 2013: Vitalis and redgas, both operating in the eastern market area; Gutmann, which only supplies customers in Tyrol and Vorarlberg; and PGNiG (PST), which operates nationwide. All of the new entrants were provided with E-Control's guidelines for market entry, which were drawn up in 2013. E-Werk Wels launched its new gas supply brand gastino, a counterpart to its voltino electricity brand, at the end of April 2014.



Source: E-Control tariff calculator, April 2014

Chart 63
Choice of products for households

Customer choice in Tyrol and Vorarlberg has expanded markedly since the introduction of the new market model and the opening of the retail market in October 2013. While in 2012 there was only one alternative supplier, goldgas, small consumers in Tyrol can now choose from seven suppliers, and those in Vorarlberg have a choice of nine different gas products from eight suppliers. In addition to the new suppliers, erdgas oö, gasdiskont and Kelag have begun offering products to consumers in both Tyrol and Vorarlberg, and TIGAS has started serving consumers in Vorarlberg.[55]

In the eastern market area, households in Vienna have the greatest choice, with a total of 25 gas products on offer – five of them from local players. Household consumers in Styria are offered the widest range of products from alternative suppliers – 23 from 16 suppliers.[56]

Household and other small consumers normally have short-term contracts without minimum offtake obligations, and without explicit escalation clauses tied to oil prices or gas markets. Instead, there is step-fixed pricing, i.e. the gas price is adjusted at irregular intervals determined by the supplier. This means there is generally a time lag between a fall or rise in wholesale prices – and hence in the gas companies' purchasing prices – and a corresponding change in the prices paid by consumers. However, as in the electricity sector, alternative pricing models

[55] E-Control tariff calculator, status as of April 2014
[56] E-Control tariff calculator, status as of April 2014 (see Chart 63)

NET ENERGY PRICES BY SUPPLIER, EUR/year (households, 15,000 kWh/y)

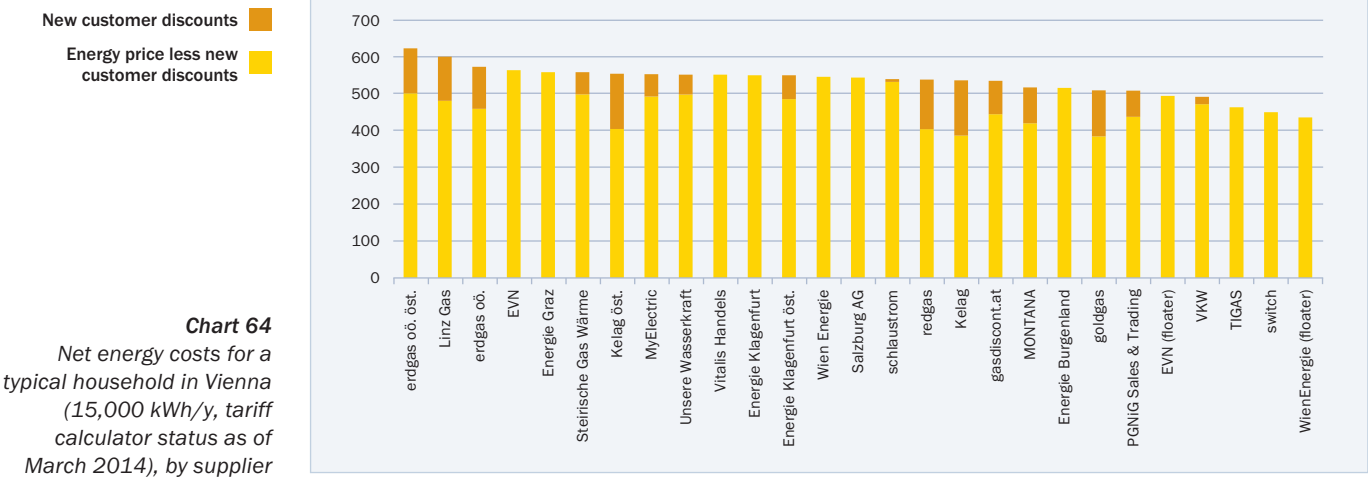


Chart 64
Net energy costs for a typical household in Vienna (15,000 kWh/y, tariff calculator status as of March 2014), by supplier

Source: E-Control tariff calculator

including price guarantees and index-linked prices are also available.

Products vary in terms of the commitment period (none, six or up to 12 months), form of correspondence (online) and composition (admixture of biogas). There is no significant difference between the prices of products for households and those for SMEs.

Discounts and rebates are still the main form of price differentiation used by alternative suppliers. However, the frequency of such campaigns has risen significantly. Discounts offered to new customers following a supplier transfer can cut total energy costs by up to 28% over the first year. Leaving aside any new customer discounts, the energy costs for a Viennese household with annual gas demand of 15,000 kWh recently ranged from EUR 436 to EUR 624 (excluding system charges, taxes and levies).

Demand-side
In 2013 gas was supplied to 1.35m metering points in Austria, virtually unchanged from the previous year. Households account for around 94% of all metering points, but only about 22% of gas consumption.

Switching rates
Supplier transfers reached record levels for the third year in a row in 2013, with an especially high rate among household

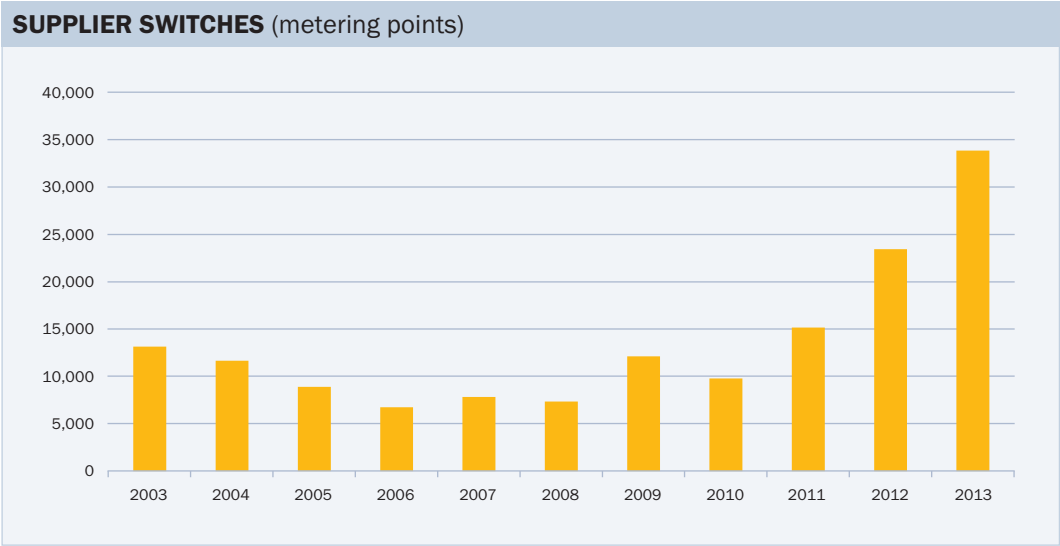


Chart 65
Supplier switches, 2001-2013

Source: E-Control

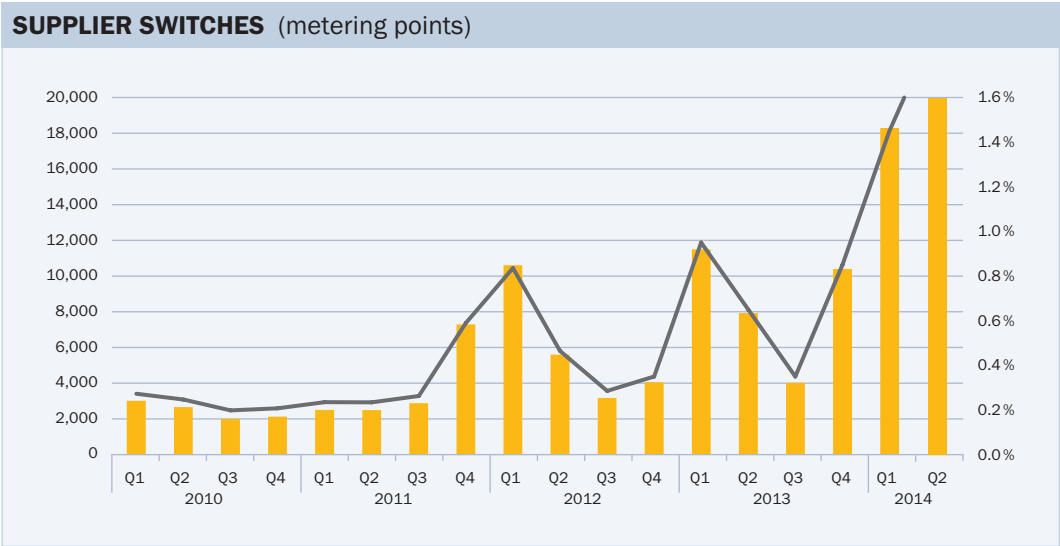


Chart 66
Supplier switches and switching rates, 2010-Q2 2014

Source: E-Control

POTENTIAL SAVINGS IN GAS COSTS, EUR/year (households, 15,000 kWh/y)

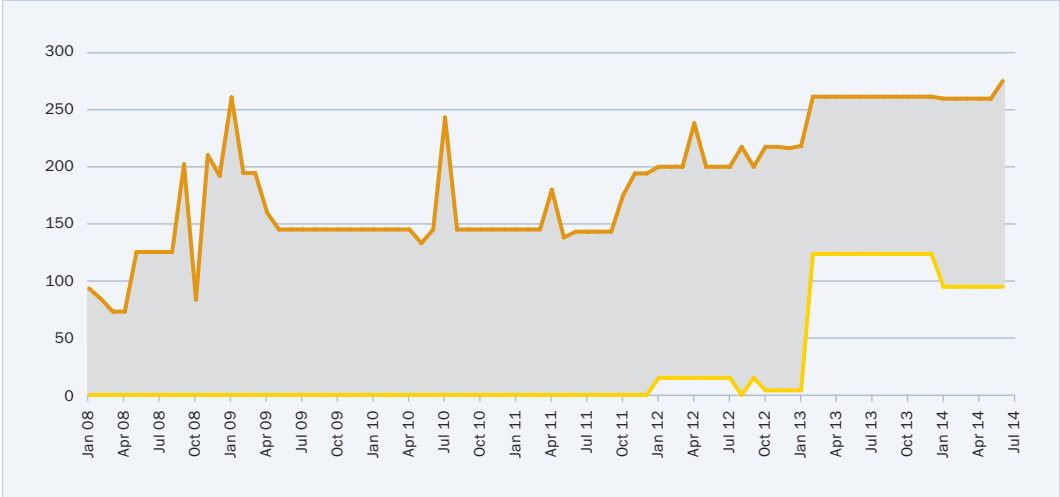


Chart 67
Potential savings for a typical household (15,000 kWh/y) switching from an incumbent to the cheapest supplier (energy costs incl. VAT; changes to system charges, taxes and levies not included)

Source: E-Control

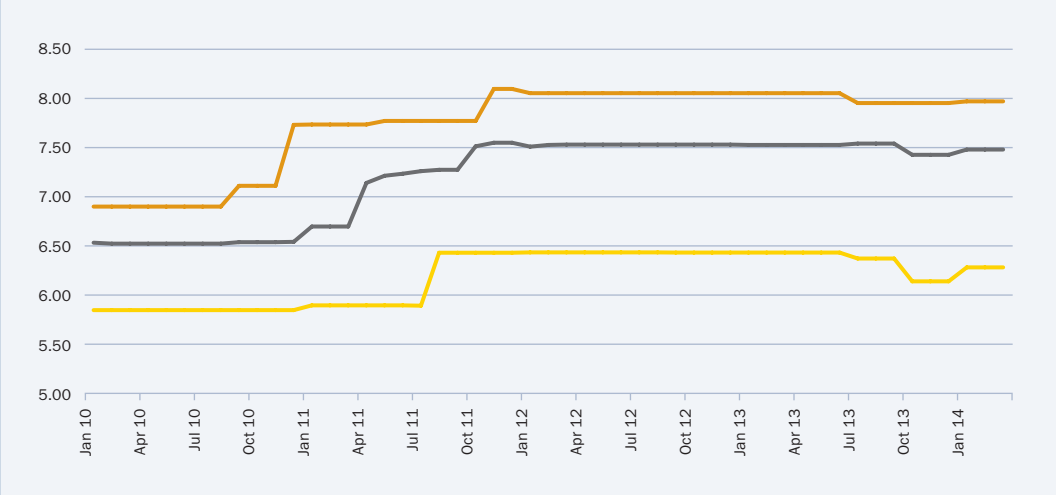
consumers. As in the electricity sector, media focus on the topic of energy costs, as well as new suppliers and products and the high potential for savings contributed significantly to this. A total of 31,051 households changed supplier in 2013, a year-on-year increase of 47%. Comparing switching rates in the various federal provinces, the highest rate was seen in Upper Austria (4.2%), followed by Lower Austria (3.7%) and Styria (2.7%).

Some 46,676 gas consumers, or 3.5% of all metering points, switched suppliers in the first half of 2014. This is also a record – in the first two quarters of the year, the same number of consumers changed supplier as in the preceding seven quarters. 44,927 or 3.5% of households, 287 or 3.7% of load-metered consumers, and 287 or 2.1% of other small consumers switched supplier. The largest number of transfers was in Vienna (19,720), followed by Lower Austria (12,430), Upper Austria (9,522) and Styria (2,692). The highest switching rate was recorded in Upper Austria (6.4%), followed by Styria (4.4%) and Lower Austria (4.2%). In Vienna the rate was below the national average, at 3.0%. It is worth noting that the gas supply volumes being transferred to a different provider are falling, in spite of (or even because of) the high proportion of household and other small consumers switching supplier. Most changes of supplier were carried out as part of the Austrian Consumers Association's Energiekosten-Stop campaign:[57] around 30,000 households[58] transferred supplier to take advantage of this special offer.

The potential savings from changing from the local player to the cheapest provider have almost doubled in the last five years. In June 2014 potential savings reached an all-time

[57] See VKI Energiekosten-Stop campaign, page 65
[58] VKI press release, 6 May 2014

TOTAL GAS PRICE, OVER TIME, cents/kWh



Source: E-Control

Chart 68
Total price (energy, system charges, taxes and levies) over time for a typical household (15,000 kWh/y), standard products from local players, Austrian weighted average, maximum and minimum

high of EUR 275 for typical households in Linz.

Price trends

Household consumers

Salzburg AG and TIGAS both reduced their energy prices at the beginning of 2014. The fall in the price charged by Salzburg AG was 9.7% greater than the increase in 2013, and the TIGAS price reduction was 4.9% less than its price rise in 2013. In autumn the EnergieAllianz companies (Energie Burgenland, EVN and Wien Energie) dropped their prices by between 3.7% and 5.44%. The adjustments to the system charges varied between the different grid zones.

Average gas costs fell slightly at the beginning of 2014 (see Chart 68). The largest price increase (2.3%) was for households in Tyrol, where annual costs for a typical household with demand of 15,000 kWh climbed by EUR 24. In contrast, household consumers in Salzburg are paying 5.9% less. For a typical household this equates to annual savings of EUR 68.

International comparison of household prices

A European comparison reveals that total prices in Austria including taxes and levies remain in the upper mid-table bracket. Total household prices in Austria were 7.54 cents/kWh in the second half of 2013 – 0.47 cents/kWh above the EU-28 average and 0.35 cents/kWh below the EU-18 average (see Chart 69). This represents a 1% reduction in total prices compared to the same period in 2012.

Taxes and levies accounted for 28% of total costs, which was higher than the HEPI[59] average (see Chart 70). They made up 57%

[59] The European Household Energy Price Index (HEPI) is compiled by E-Control in cooperation with VaasaETT and the Hungarian regulator, MEKH. This weighted index tracks price trends throughout Europe. It is calculated on the basis of the electricity and gas prices of the incumbents and their leading competitors in the various capital cities. The analysis takes the tariffs most widely used by consumers in each city.

EUROPEAN HOUSEHOLD GAS PRICE COMPARISON, cents/kWh

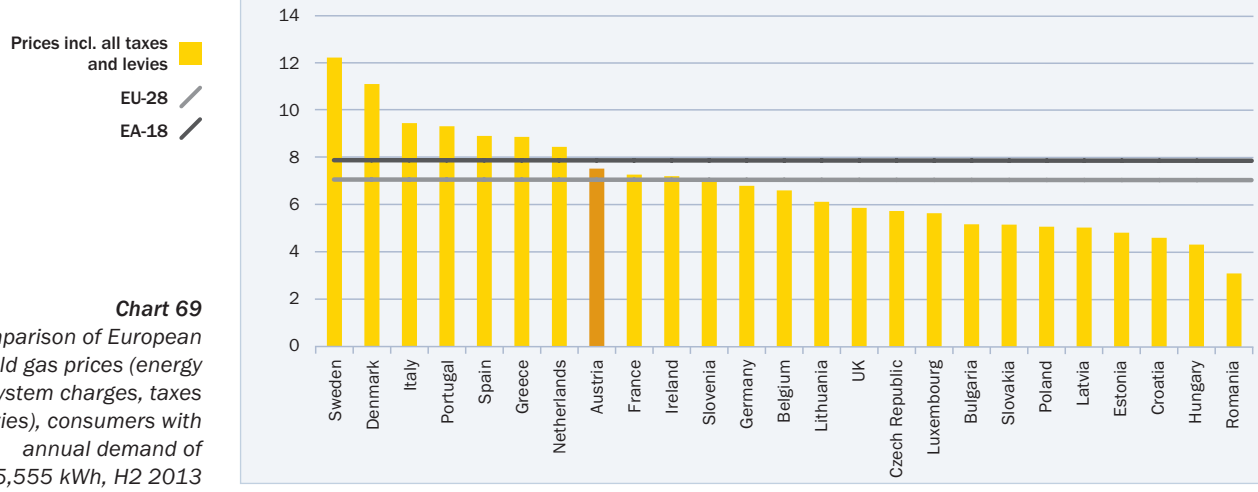


Chart 69
Comparison of European household gas prices (energy and system charges, taxes and levies), consumers with annual demand of 5,555-55,555 kWh, H2 2013

Source: Eurostat, status as at 15 September 2014

BREAKDOWN OF GAS COSTS IN SELECTED EUROPEAN CITIES, %

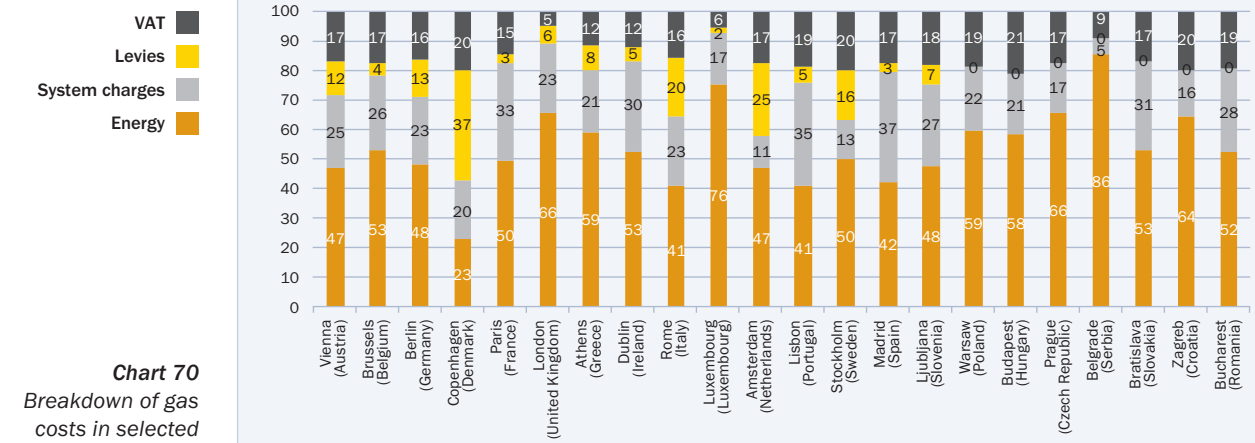


Chart 70
Breakdown of gas costs in selected European cities

Source: HEPI May 2014, E-Control

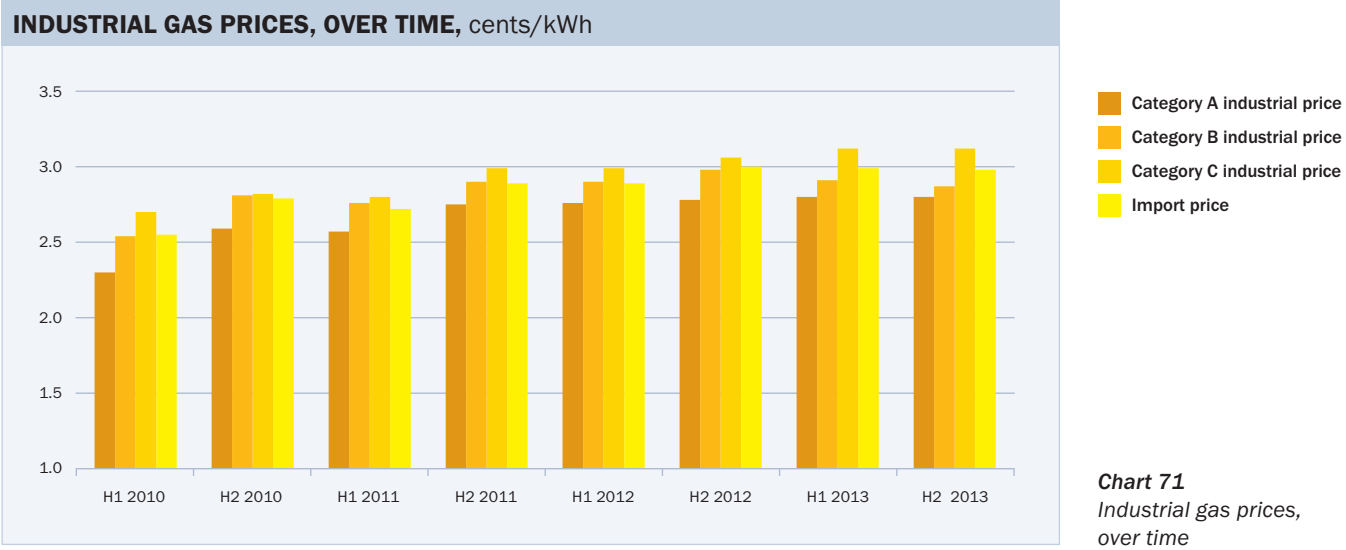


Chart 71
Industrial gas prices, over time

Source: E-Control industrial price survey

of total prices in Copenhagen and 42% in Amsterdam, whereas in Luxembourg they were only 7% and in London 9% of the total. In Vienna the unregulated component (energy) accounted for 47% of the overall cost of gas – below the HEPI average of 54%.

Gas prices charged to load-metered consumers

Since the second half of 2003 E-Control has surveyed the energy prices paid by Austrian industrial consumers directly on a biannual basis (in January and July), using an online form.[60] The survey results show that prices in categories A and C rose year on year in 2013, by one and two percentage points respectively, while Category B prices fell by four percentage points. Import prices were virtually unchanged. Prices were still above the very high levels reached in the second half of 2008 and the first half of 2009 (see Chart 71).

The survey results also show that competition between suppliers in the gas sector is seen as less intense than in the electricity sector.

European comparisons

Industrial gas prices (energy prices and system charges, excl. tax) in Austria are below the EU-28 and EA-18 averages, markedly lower than prices in Germany and Denmark, and higher than those in the UK, Belgium and the Netherlands (see Chart 72).

[60] The results are posted on our website (www.e-control.at).

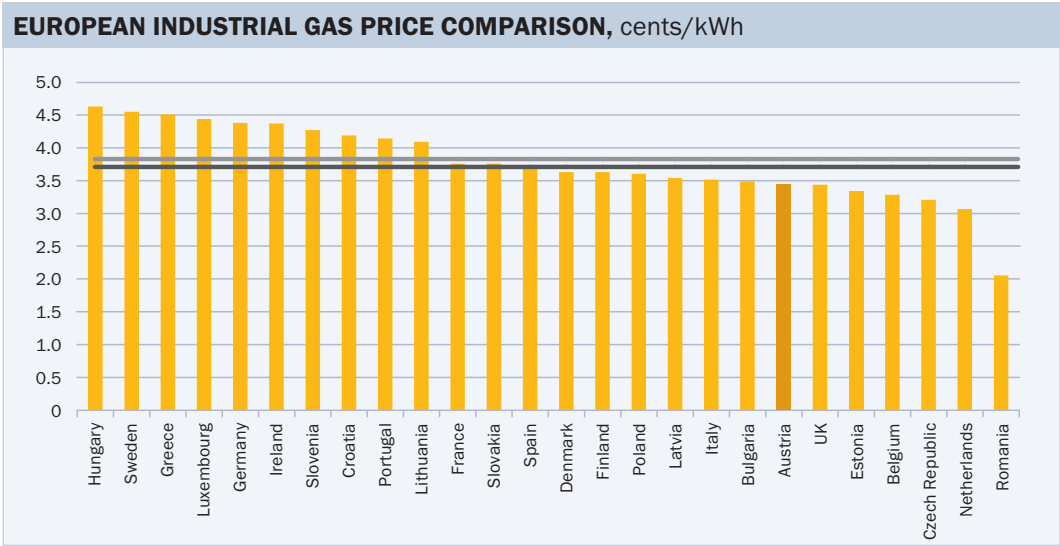


Chart 72
Comparison of industrial gas prices in EU member states, group I3 (consumption of 2.8-27.8 GWh), H2 2013

Source: Eurostat, status as at 24 June 2014

SECURITY OF SUPPLY: GAS

Domestic supply and demand balance

Around 80% of supply comes from imports. Previously, import levels were usually relatively constant, except in summer when additional volumes were required to refill storage facilities. This pattern is increasingly giving way to wider seasonal swings, with imports tending to fall in winter and rise in summer. Lower imports in winter are compensated for by additional storage capacity (see Chart 73).

Austria has two domestic gas producers – OMV Austria Exploration & Production GmbH and Rohöl-Aufsuchungs AG (RAG). Some 1.6bn N cu m of natural gas[61] were produced in 2011 – equal to about 20% of domestic consumption. OMV Austria Exploration & Production contributed about 83% of total output (see Table 23). As at 1 January 2011 the two companies' combined proven and probable reserves totalled 24.7bn N cu m.

Shifts in gas demand are mainly driven by outdoor temperatures and power station use, while industrial demand represents a relatively steady baseload. Supplies to households, small and medium-sized enterprises, and large-scale industry are always sufficient, so all in all supply and demand can be seen as well balanced. In 2011 about 80% of all physical gas imports were re-exported. Physical imports totalled some 488 TWh during that year. Most of the physical exports – about 21.7bn N cu m – went to Italy (see Table 24).

[61] Including associated gas.

GAS BALANCE, 2010 AND 2011, GWh

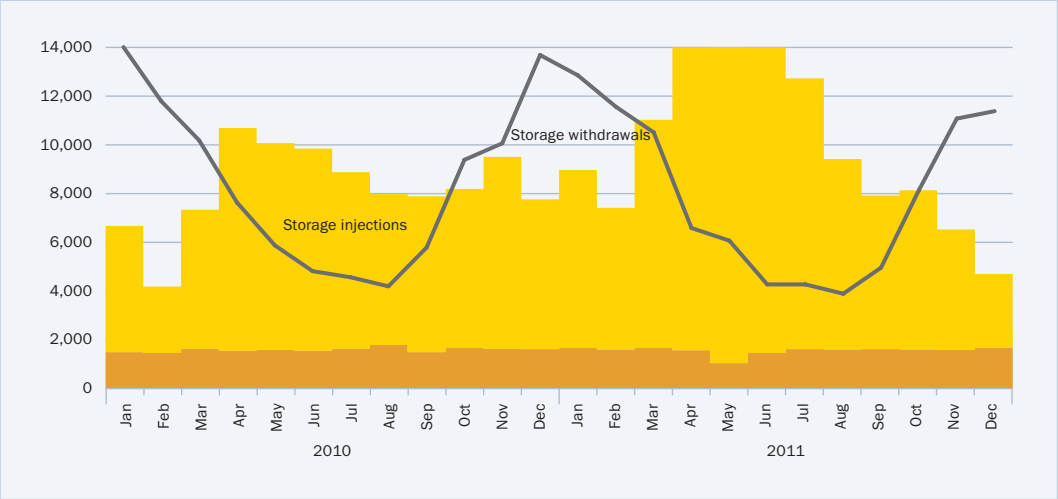


Chart 73
Gas balance, 2010 and 2011, GWh

Source: E-Control

SALES IN THE EASTERN DISTRIBUTION AREA

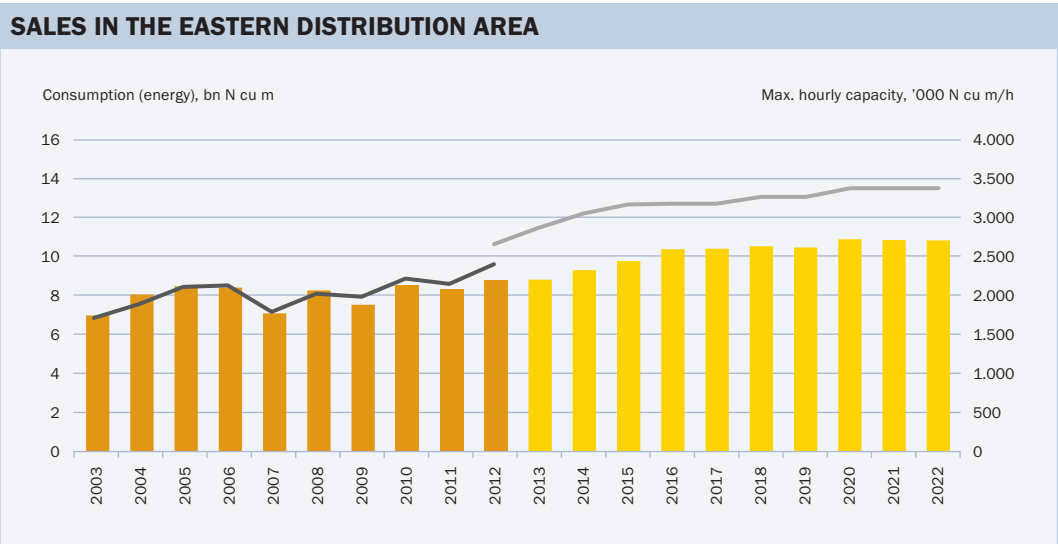


Chart 74
Sales in the eastern distribution area

Source: AGGM

Table 23
Natural gas production in Austria, 2011

NATURAL GAS PRODUCTION IN AUSTRIA, 2011			
	million N cu m	%	% change 2010
OMV Austria Exploration & Production	**1,319**	82.9	–10.8
Rohöl-Aufsuchungs AG	272	17.1	20.4
Total	**1,591**	**100.0**	**–6.6**

Source: Geologische Bundesanstalt (Geological Survey of Austria), http://www.geologie.ac.at/

Table 24
Physical imports and exports, 2011

AUSTRIAN NATURAL GAS TRADE BALANCE, PHYSICAL IMPORTS AND EXPORTS,* 2011				
	Imports		Exports	
	GWh	million N cu m	GWh	million N cu m
Germany	82,304	7,355	35,533	3,175
Switzerland	–	–	611	55
Italy	–	–	279,583	24,985
Slovenia	–	–	16,832	1,504
Hungary	–	–	46,799	4,182
Slovakia	405,346	36,224	5,110	457
Czech Republic	549	49		
Total	**488,199**	**43,628**	**384,467**	**34,358**

** Physical metering data at cross-border IPs*

Source: E-Control

Forecast demand and available supplies

The demand projections shown in Chart 74 are derived from a forecast by the distribution area manager, AGGM. Estimates are based on demand growth forecasts for small consumers and specific projects. The results of a survey of balance responsible parties indicate that long-term demand growth is not covered by supply. However, it can safely be assumed that supply will be expanded as soon as the size of the shortfall is definitely known. New suppliers or sources of supply may be called on, so infrastructure development planning will need to accommodate network flexibility, especially at entry points.

Additional capacity being planned or under construction

On 1 April 2011 Gas Connect Austria GmbH commissioned 424,400 N cu m/h of physical reverse flow capacity from Germany to Austria at the Überackern IP.

On 1 October 2011, 1,552,960 N cu m/h of physical reverse flow capacity from Italy to Austria was brought onstream at the Arnoldstein IP (TAG).

The capacity of the WAG pipeline system is currently being expanded in both directions. The WAG Plus 600 project was completed during the first quarter of 2011. The WAG Expansion 3 project designed to raise capacity by approximately 230,000 cu m/h in both directions was scheduled for completion in 2013.

A new compressor station entered service in Baumgarten during the first quarter of 2012. This project, aimed at keeping pace with domestic demand growth, was approved as part of the 2007 long-term plan.

Quality and level of network maintenance

Network operation and maintenance (O&M) must comply with the relevant technical rules (the ÖNORM and ÖVGW standards). A study commissioned by E-Control[62] gives a comprehensive account of the minimum requirements for safe and reliable gas network operation.

The technical quality of network services is largely a reflection of the O&M standards. Key aspects are supply reliability, gas quality and operational security of supply (network operation, maintenance and dispatching). The aim is to ensure that the right quantity of natural gas conforming to specifications for quality and operating pressure is delivered to customer installations without interruption.

E-Control surveys technical quality indicators as part of its efforts to monitor the quality of the network services provided by Austrian gas distribution system operators. Chapter XII(3) General Terms and Conditions of Distribution System Operators requires system operators to publish such indicators for the preceding calendar year at least annually, on 1 March.

Action to meet demand peaks and respond to outages of one or more suppliers

In principle, all consumers have equal priority, but it is safe to say that at peak times there would not be enough gas and transportation capacity to supply all customers at the same time – especially if all the gas-fired power stations were to operate at full load. As the supply-side options are limited, congestion management is performed by adjusting deliveries to power stations. The demand

[62] Kiesselbach G., TÜV Österreich, Zusammenstellung von allgemein gültigen Mindestanforderungen an einen sicheren und zuverlässigen Gasnetzbetrieb entsprechend den gesetzlichen und technischen Rahmenbedingungen in Österreich [Survey of general minimum requirements for safe and reliable gas system operation according to the legal and technical conditions in Austria], December 2005 (German only), http://www.e-control.at/de/publikationen/publikationen-gas/studien/gasnetzbetrieb

peaks of households, small and medium-sized enterprises, and industry can always be accommodated.

As the normal balancing system is only capable of meeting a small part of any shortfalls caused by supplier outages, contingency plans are in place comprising a range of congestion management measures, chosen according to the severity and duration of under-supply. Section 25 Natural Gas Act 2011 requires the distribution area manager to prepare and implement an action plan in consultation with the affected system operators, balance responsible parties, suppliers, clearing and settlement agents, and storage and production system operators in the event of short- or medium-term congestion.

Provision is made for statutory intervention if it is not possible to overcome a supply shortfall by means of market-based measures. To permit ongoing assessment of the supply situation and plan emergency intervention measures, since 2007 we have conducted periodic, comprehensive data surveys; the data are processed by E-Control and the DAM.

Storage capacity
(Gas storage)

Austrian gas storage facilities have a total working gas capacity of about 7.1bn cu m and a withdrawal capacity of around 3.6m cu m/h (see Table 16 on page 94). Companies operating on the Austrian market can also use the Pozagas Lab 4 facility in Slovakia (620m cu m; 6.9m cu m/day).

Long-term gas supply contracts

The long-term contracts currently in place provide for:

- approx. 7bn cu m/year of Russian gas from Gazprom Export;[63]
- approx. 1.2bn cu m/year of Norwegian gas,[64] and
- smaller quantities from German suppliers.

As announced in press releases in 2006,[65] Gazprom Export concluded new Russian gas import contracts to run until 2027 with EconGas, GWH Gashandel GmbH and Centrex. The same importers have contracts with Norwegian suppliers. We do not know of any other import contracts.

Regulatory frameworks designed to provide adequate incentives for investment

Section 33(2) Natural Gas Act 2011 creates an incentive to invest in transportation infrastructure by providing for network development contracts. These result in reciprocal obligations on the part of system users and operators, in the interests of increased planning certainty for transmission pipelines and other investments. Investment security is also underpinned by the approval

[63] See APA ots news, 29 Sep 2006
[64] See Norwegian Petroleum Directorate, http://www.npd.no/en/Publications/Facts/Facts-2009/; Chapter 6, Norwegian gas exports, p. 49
[65] See OMV press release dated 29 Sep 2006 on www.omv.com

of the projects concerned by E-Control as part of the long-term plan, which section 18 Natural Gas Act 2011 requires the DAM to draw up. This procedure assures system operators of regulated tariffs adequate to finance their investments, meaning that system users and customers can be certain the projects will go ahead.

Implementation of Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply

A working group under the chairmanship of the Ministry of Science, Research and Economy, consisting of representatives of the gas industry, industrial and other consumers and the regulator drew up a risk assessment pursuant to Art. 9 of this Regulation. The group looked into compliance with the infrastructure standard (N-1 criterion) established by Art. 6 and the supply standard established by Art. 8 of the Regulation.

The calculation applying the N-1 criterion in accordance with Annex I yielded a result of 161%, meaning that the existing Austrian gas infrastructure conformed to the infrastructure standard (indicated by a result of over 100%).

The risk assessment reached the conclusion that the vast majority of the disturbances observed carried a low risk of outages of supplies to protected customers, due to the level of development and quality of the Austrian gas grid, storage facilities and production systems. The preventive action plan drawn up on the basis of the assessment contains recommendations for dealing with the moderate to high-risk disturbances identified. Some of the recommendations are already being implemented.

The working group has also drawn up an emergency plan, and has consulted the regulators of neighbouring countries on it. The emergency plan draws on the gas industry emergency response manual, which first appeared in 2007.

UNBUNDLING IN THE ELECTRICITY AND GAS SECTORS

E-CONTROL COMPLIANCE REPORT

Pursuant to Art. 26 Directive 2009/72/EC (Electricity Directive) and Art. 26 Directive 2009/73/EC (Gas Directive), E-Control is empowered to monitor compliance with the unbundling requirements. The gas and electricity distribution system operators were required to submit their compliance reports for 2012 to E-Control by the end of the second quarter of 2013. In line with the statutory requirements, reports on all gas and electricity distribution system operators were published on the E-Control website. The unbundling requirements established by the Electricity Act 2010 and the Natural Gas Act 2011, which entered into force in March 2011 and November 2011 respectively, now apply, and there was no transition period.

COMMUNICATION ACTIVITIES AND BRANDING (CORPORATE IDENTITY)

In their communication and branding, vertically integrated distribution system operators may not create confusion in respect of the separate identity of the supply branch of the vertically integrated undertaking (VIU). When assessing the distinctiveness of brands, the factors to be taken into account include the degree of similarity to other signs, and to other goods and services, the differentness or closeness of the sectors of industry concerned, the distinctive character (inherent distinctiveness) of the sign, and any increased protection due to the reputation of the sign. The key consideration is the likelihood of confusion. Similarity of logos and brands is to be checked in terms of the images used, and the meanings and sounds of words.

The impression made by the company name, wordmark and logo, patent-protected graphics and colour scheme must not lead the average consumer to believe that services are provided by the same company. In 2013 the following DSOs made changes to their communication and branding policies: Netz Oberösterreich GmbH, Netz Niederösterreich GmbH, Stromnetz Steiermark GmbH, Wiener Netze GmbH, KNG-Kärnten Netz GmbH and Salzburg Netz GmbH. Like its electricity-sector counterpart in 2012, Netz Burgenland Erdgas GmbH adapted its corporate identity. Other companies changed their logos in 2013, namely Netz Niederösterreich GmbH, KNG-Kärnten Netz GmbH and Wiener Netze GmbH.

The initiation of market abuse proceedings in 2013 helped to ensure the distinctiveness of all system operators' corporate identities. An overview is provided in Charts 75 and 76.

CASES OF DISCRIMINATION

Following complaints from consumers, E-Control instigated market abuse proceedings on account of discriminatory behaviour pursuant to section 9 Electricity Act 2010 and section 11 Natural Gas Act 2011. In some cases, the opening of proceedings was sufficient to ensure compliance with the legal framework, and the companies in question made commitments to refrain from discriminatory behaviour in future.

In the cases where discrimination was proven – i.e. where discrimination had taken place and it was no longer possible to order compliance with the law – charges carrying fines of up to EUR 75,000 were filed with district administrative authorities in accordance with section 99(2)(1) Electricity Act or section 159(2)(1) Natural Gas Act.

ELECTRICITY SYSTEM OPERATORS' BRANDING	
Group logo	**System operator's logo (as of 31 July 2013)**
Energie Burgenland AG	Netz Burgenland Strom GmbH
Energie AG Oberösterreich Vertrieb GmbH & Co KG	Netz Oberösterreich GmbH
EVN Energievertrieb GmbH & Co KG	Netz Niederösterreich GmbH
Energie Graz GmbH & Co KG	Stromnetz Graz GmbH & Co KG
Steweag-Steg GmbH	Stromnetz Steiermark GmbH[66]
TIWAG-Tiroler Wasserkraft AG	TINETZ Stromnetz Tirol AG
Verbund Sales GmbH	Austrian Power Grid AG
Vorarlberger Kraftwerke AG	Vorarlberger Energienetze GmbH
Wien Energie Vertrieb GmbH & Co KG	Wiener Netze GmbH
KELAG-Kärntner Elektrizitäts-Aktiengesellschaft	KNG-Kärnten Netz GmbH
Linz Strom Vertrieb GmbH & Co KG	LINZ STROM Netz GmbH
Salzburg AG	Salzburg Netz GmbH

Chart 75
Electricity system operators' branding

Source: E-Control

[66] Stromnetz Steiermark has been renamed Energienetze Steiermark

GAS SYSTEM OPERATORS' BRANDING

Group logo	Logo Netzbetreiber (Stand zum Stichtag 31.7.2013)
Energie Burgenland Vertrieb Erdgas GmbH & Co KG	Netz Burgenland Erdgas GmbH
Wien Energie Vertrieb GmbH & Co KG	Wiener Netze GmbH
Linz Gas Vertrieb GmbH & Co KG	Linz Gasnetz GmbH
Salzburg AG	Salzburg Netz GmbH
EVN Energievertrieb GmbH & Co KG	Netz Niederösterreich GmbH
KELAG-Kärntner Elektrizitäts-Aktiengesellschaft	KNG-Kärnten Netz GmbH
OÖ. Gas-Wärme GmbH	OÖ. Ferngas Netz GmbH
OMV Gas & Power GmbH	Gas Connect Austria GmbH
OMV Gas & Power GmbH, GDF, E.ON Vertrieb	Trans Austria Gasleitung GmbH
OMV Gas & Power GmbH, CDP	Baumgartner Oberkappel Gasleitungs GmbH

Chart 76
Gas system operators' branding

Source: E-Control

CERTIFICATION

By way of official decision V ZER 01/11 dated 12 March 2012, E-Control certified Austrian Power Grid AG pursuant to sections 28-32 Electricity Act 2010 in conjunction with section 34(1)(3) of that Act. As a vital source of stability, the company remains under the ownership of Verbund, but must meet very strict conditions in terms of its organisational separation from the group. These include the complete separation of personnel, IT and communications, the prohibition of shared services, and regulation of the relationships of senior managers with the integrated undertaking. Decision V ZER 02/11 of 1 June 2012 certified Vorarlberger Übertragungsnetz GmbH as an ownership unbundled transmission system operator.

Decision V ZER G 01/12 of 6 July 2012 certified Gas Connect Austria GmbH as an independent transmission system operator (ITO) pursuant to sections 112-116 Natural Gas Act 2011 in conjunction with section 119(1)(3) of that Act.

The application from Trans Austria Gasleitung GmbH (TAG) for certification as an independent system operator (ISO) (V ZER G 03/12) and that from Baumgarten-Oberkappel Gasleitungsgesellschaft mbH (BOG) for certification as an ITO (V ZER G 02/12) were rejected owing to their failure to meet the requirements under the respective unbundling models. New applications for certification have been received from both TAG (V ZER G 04/13) and BOG (V ZER G 01/14), and E-Control has forwarded draft official decisions to the European Commission in order to obtain its opinion. E-Control is obliged to take the Commission's observations into account as far as possible.

MONITORING OF COMPLIANCE WITH LEGAL REQUIREMENTS – PROCEEDINGS AGAINST COMPANIES

In addition to the aforementioned proceedings in respect of unbundling and discrimination, E-Control also instigated actions designed to monitor compliance with EU legal provisions.

The prevention of cross-subsidisation between transmission, distribution and retail activities pursuant to Art. 37(1)(f) Electricity Directive was the subject of an approval procedure for a combined system operator.

Proceedings related to discrimination by a distribution system operator were initiated, some of which resulted in charges being brought. Compliance with the provisions of Art. 3(5) Electricity Directive regarding customer rights and the right to switch supplier is the subject of ongoing proceedings, and in some of these cases we have also filed charges.

The proceedings relate in part to discriminatory behaviour by DSOs in relation to consumers (disconnection of customers during a supplier switch and the discriminatory transfer of data to VIUs), as well as to obstruction of the supplier switching process by VIUs.

CONSUMERS

NEW REGULATIONS FOR THE PROTECTION OF CONSUMERS IMPLEMENTED UNDER THE THIRD ENERGY PACKAGE

A number of new consumer protection regulations were established by law or entered into force in 2013.

REGULATIONS FOR THE PROTECTION OF CONSUMERS, INCLUDING VULNERABLE CONSUMERS, IN AUSTRIAN ENERGY LEGISLATION IN 2013

Qualified reminder procedure (section 82(3) Electricity Act and section 127(3) Natural Gas Act)

In the event of breach of contract (usually payment default), system operators and suppliers are only entitled to disconnect a customer after sending at least two reminders. Reminders must be issued in writing and allow a grace period of at least two weeks for payment. The second reminder must also include a warning that the customer will be disconnected, provide information on the resulting costs and refer to the consumer's right of recourse to a customer service and advice centre (i.e. that of the supplier). The second/final reminder must be sent by recorded delivery.

Prepayment meters as an alternative to deposits or prepayment (section 82(5) Electricity Act 2010 and section 127(5) Natural Gas Act 2011)

All non-load metered customers have the right to use a prepayment meter if a system operator or supplier demands a deposit or prepayment.

Basic supply (section 77 Electricity Act 2010 and section 124 Natural Gas Act 2011)

Consumers in the meaning of the *Konsumentenschutzgesetz* (Consumer Protection Act) and small businesses can invoke their right to a basic supply from their system operator or any prospective energy supplier, which are then obliged to provide energy at a tariff not higher than that paid by the majority of their customers (the general tariff). If the supplier demands a deposit or prepayment, this may not exceed one monthly instalment, and this must be repaid if the customer does not default on payment within the first six months of basic supply. All outstanding debts relating to previous contracts remain unaffected. If a consumer defaults once again while receiving basic supply, the system operator and/or supplier is entitled to disconnect the consumer, unless the latter agrees to advance payment by means of a prepayment meter. Requests for prepayment meters from consumers receiving basic gas supply may only be rejected on account of safety concerns on the part of the system operator.

Replacement supply (section 77a Electricity Act 2010 and section 124a Natural Gas Act 2011)

If a supplier terminates its contract with a balance responsible party (e.g. in the event of the bankruptcy or insolvency of the supplier), E-Control shall draw lots to determine which of the remaining suppliers in shall supply energy to the metering points (i.e. customers) that remain in the balance group from that point on. The affected customers must be notified of this by the new supplier, which is obliged to supply energy at a reasonable cost, whereby the prices charged to households may not exceed those charged by that supplier to customers who already pay household tariffs. The customer has the right to terminate this supply agreement within two weeks if they would like to switch to a different supplier.

Maximum charges for specific services provided by system operators

The System Charges Ordinance for Electricity and the System Charges Ordinance for Gas stipulate maximum charges that may not be exceeded for certain services provided by the system operator. They specify the metering charges (including for prepayment meters), reminder fees (e.g. no fee may be charged for the first reminder), disconnection fees (max. EUR 30) and fees for reading or inspecting metering equipment at the request of the system user.

Customer service and advice centres (section 82(7) Electricity Act 2010 and section 127(7) Natural Gas Act 2011)

From 1 January 2015 large suppliers (those with at least 50 employees, or revenue or total assets of more than EUR 10m) are obliged to set up a service and advice centre for customers seeking information on power labelling, supplier transfers, energy efficiency, electricity prices and energy poverty.

Exemption from renewable electricity charges

Pursuant to the *Befreiungsverordnung Ökostrom* (Green Electricity Cost Exemption Ordinance), persons who are entitled to an exemption under the *Fernsprechentgeltzuschussgesetz* (Telephone Charges Subsidies Act) (otherwise known as persons exempt from paying Gebühren Info Service GmbH (GIS) radio and television licence fees) are entitled to exemption from payment of the flat renewable electricity charge (2013: EUR 11), and of a renewables contribution in excess of EUR 20.

QUALITY ORDINANCES

The *Netzdienstleistungsverordnung Strom* (Ordinance on Electricity System Service Quality; amended version entered into force on 1 July 2013) and the *Gasnetzdienstleistungsqualitätsverordnung* (Ordinance on Gas System Service Quality; entered into force on 1 January 2013) amend the requirements related to the quality of service provided by system operators. They also prohibit disconnection of customers before weekends and public holidays. In addition to the service quality requirements for system operators introduced in the past few years, the amendments specify that repairs and maintenance must be carried out in the presence of the system user, and the system operator must arrange a time slot of up to two hours, taking into account the wishes of the user (this also applies to meter readings for which the presence of the system user is also required).

Distribution system operators are still required to implement appropriate structures that allow them to respond to and deal with enquiries and complaints from system users within five working days. If this is not possible within the specified period (electricity) or if the distribution system operator is unable to respond due to circumstances beyond its control (gas), the response must at least include information on the next steps, the expected time required to deal with the enquiry or complaint, and the details of a contact person. Complaints that have not been resolved to the system user's satisfaction can be referred to the E-Control dispute settlement service. Customers must also be permitted to submit self-read meter readings in electronic form at any time.

Monitoring ordinances

From 2013, network operators are required to submit data on a number of indicators to the regulator. This is designed to support monitoring of compliance with consumer protection standards and their effectiveness. Section 88 Electricity Act and section 131 Natural Gas Act oblige distribution system operators to provide the regulator with statistics on provision of system access, system utilisation, timely invoicing, supplier switching, disconnections, the number of prepayment meters installed, and customer enquiries and complaints for 2012 and subsequent years. This is intended to facilitate monitoring of the market, competition and consumer protection. The *Gas Monitoring-Verordnung* (Gas Monitoring Ordinance) sets out the requirements in detail, and specifies that the regulator is solely responsible for monitoring the gas industry. In the electricity sector the provincial governments are responsible for monitoring and this is done by means of implementing legislation.

MONITORING ACTIVITIES IN 2013: ELECTRICITY

Section 88 Electricity Act obliges system operators and energy suppliers to provide the provincial governments with data for 2013 by 31 March 2014. The reporting requirements are specified in greater detail in the provincial implementing legislation, and the Act stipulates the main aspects of the provincial governments' monitoring activities.

E-Control worked in conjunction with representatives of the provincial governments to create a survey form for fulfilment of this obligation. The form only covers the minimum amount of data to be provided, but has the advantage that the provincial governments have agreed to coordinate its implementation.

The reports for 2013 received by E-Control only allow for a very limited analysis of the consumer-related aspects of monitoring in the electricity industry. However, there is clearly a need for the provincial authorities to play a more active role in fulfilling their monitoring responsibilities.

MONITORING ACTIVITIES IN 2013: GAS

Under the Gas Monitoring Ordinance, market participants are obliged to supply data on a series of market- and competition-related topics specified by E-Control on a monthly and annual basis. The information required to enable E-Control to meet its monitoring obligations relates to prices, supply, the number of consumers, the number of enquiries and complaints and the reasons for them, new connections and cancellations, supplier transfers, the number of final reminders, disconnections, and provision of supply of last resort (basic supply) and the number of prepayment meters installed, broken down by customer groups.

Enquiries and complaints

The reports received from suppliers show that non-load metered customers submitted over one million queries in 2013, half of them in connection with billing. The suppliers handled more than 20,000 complaints during the year.

The distribution system operators recorded some 150,000 enquiries and over 1,300 complaints from non-load metered customers.

Final reminders

Pursuant to section 127(3) Natural Gas Act, suppliers issued in excess of 20,000 final reminders by recorded delivery to non-load metered customers in 2013. In contrast, the distribution system operators stated that they sent more than ten times as many such reminders.

Basic supply
A total of 15 non-demand metered customers received basic supply. This figure relates to only two suppliers in a total of four network areas, indicating that providing basic supply is not common practice in Austria.

Disconnections
18 of the 21 system operators submitted reports, stating that more than 8,000 customers were disconnected due to breach of contract (in most cases as a result of payment default). This figure is very low by international standards.

SYSTEM USER SATISFACTION (SECTION 12 ORDINANCE ON GAS SYSTEM SERVICE QUALITY)

In 2013 the gas distribution system operators carried out the first representative survey of system user satisfaction in terms of the reliability, security and quality of network services. All of the distribution system operators used a standardised questionnaire. According to the Österreichische Vereinigung für das Gas und Wasserfach (Austrian Association for the Gas and Water Industry), around 200 customers of 15 distribution system operators (out of a total of 21) were interviewed by an independent market research institute. Only a few distribution system operators forwarded the results to E-Control or published them, but the findings suggest a generally high degree of satisfaction.

Pursuant to section 88(6) Electricity Act and section 131(5) Natural Gas Act, since 2013 E-Control has been able to carry out surveys of customer satisfaction in order to evaluate the information on service and supply quality submitted by system operators in both the electricity and gas sectors. Comprehensive, cost-effective surveys have so far only been attempted on a small scale, by means of an online questionnaire as well as a test survey of customers of only a few system operators. The resulting limitations on statistical representativeness mean that it is not yet possible to draw any reliable conclusions about customer satisfaction. However, the findings show that customers who had direct contact with their system operator (e.g. by making enquiries or complaints, calling a customer service centre or reporting a self-read metering reading) tended to be less satisfied than those who did not deal directly with their system operator.

EFFECTIVENESS OF CONSUMER PROTECTION MEASURES (SECTION 28(2 AND 4) E-CONTROL ACT)

In order to monitor the effectiveness of consumer protection measures, especially those related to vulnerable consumers, to

disconnections and the qualified reminder procedure, and to the number of consumers claiming basic supply (section 28(2) E-Control Act), in 2013 E-Control set up a database to store all of the information that the system operators and energy suppliers are obliged to submit pursuant to section 88 Electricity Act and section 131 Natural Gas Act. The energy suppliers first submitted data on 31 March 2013 and in future this information should shed light on the effectiveness of consumer protection measures.

INFORMATION ON CONSUMPTION AND ENERGY COSTS, WITH OR WITHOUT SMART METERS (SECTION 81(A AND B) ELECTRICITY ACT 2010 AND SECTION 126(A AND B) NATURAL GAS ACT 2011)

The amended Electricity Act and Natural Gas Act state that suppliers must provide consumers using smart meters with details of their daily meter readings, or readings on a quarter-hourly (electricity) or hourly (gas) basis where this is required for billing purposes, as well as clearly understandable information on total consumption and energy costs in electronic form. The information must be provided free of charge. Suppliers may only refrain from providing this information at the express request of the customer. Consumers must be supplied free of charge with transparent and comprehensible information regarding their rights to such consumption data, and also given the choice of requesting details of their consumption and energy costs in hard copy, also free of charge. In the case of separate billing, this applies to both the supplier and the distribution system operator.

Customers without smart meters must receive detailed, clear and understandable information on their consumption and energy costs together with their bill. System operators are also required to give such consumers the option of providing quarterly meter readings. Consumption and cost information must be forwarded to customers free of charge and in electronic form within two weeks of the meter reading.

ONLINE SWITCHING AND SWITCHING ORDINANCES

Since their entry into force in 2013, the *Wechselverordnung Strom 2012* (Electricity Switching Ordinance 2012) and *Wechselverordnung Gas 2012* (Gas Switching Ordinance 2012) have ensured that supplier switches are completed within three weeks. Since that date it has also been possible to make a switch on any day of the week. In order to change supplier, the consumer informs the desired future supplier by submitting a declaration of intent granting full authorisation for the change. The new supplier then sets the switching procedure in motion. Information is exchanged between the old and new supplier and the system operators via an online communication system known as the switching platform. Amendment and consolidation of the two switching ordinances is planned for 2014.

In accordance with section 76(3) Electricity Act and section 123(3) Natural Gas Act, household consumers have been able to switch supplier online since September 2013. The Acts specify that non-load metered consumers may at any time, electronically and without adhering to any particular format, submit declarations of intent to suppliers, through websites to be provided by the latter, authorising the switch. Suppliers must take user-friendly precautions designed to verify and authenticate the consumer's identity. The E-Control tariff calculator includes hyperlinks which suppliers are obliged to provide and which enable consumers to access the corresponding information and websites quickly and easily.

PARTIAL EXEMPTION FROM RENEWABLE ELECTRICITY CHARGES UNDER THE GREEN ELECTRICITY EXEMPTION ORDINANCE 2012: INITIAL FINDINGS

The Green Electricity Cost Exemption Ordinance 2012 commenced on 1 July 2012. Persons are exempt from payment of the flat renewable electricity charge of EUR 11 (excluding VAT) and from a consumption-based renewables contribution in excess of EUR 20, if they are entitled to telephone charge subsidies under the Telephone Charge Subsidies Act. According to GIS, which grants the exemption and reports to E-Control in relation to it, this applied to about 250,000 people in Austria in 2013. A total of 98,655 applications were processed during the year, a year-on-year decrease of some 9%, and 72,831 (or 74%) of those were approved. Of the applications declined, the largest proportion (25,824 or 46%) were rejected due to the non-eligibility of the applicants and 7,153 or 28% because incorrect information was provided.

Figures from GIS show that 107,530 people were exempt from renewable electricity charges in 2013, a net increase of 32,375. Most of the exempted individuals/households were in Vienna (22%), Styria (19%) and Upper Austria (16%), which is in line with the distribution of Austria's population.

THE E-CONTROL ENERGY HOTLINE

The E-Control hotline is the primary source of information for gas and electricity customers. The hotline is easily reached by dialling 0810 102554 (Austria only; calls cost EUR 0.044/minute). It provides consumers with comprehensive information on the liberalised gas and electricity markets. The hotline is often the first port of call for energy-related queries, which can either be answered directly or passed on to one of our in-house experts or the dispute settlement service.

In 2013 the hotline handled 7,546 calls, an increase of 18.4% on 2012. The service also deals with written enquiries on consumer-related topics. Around 530 such enquiries were received by e-mail, post or fax in 2013 – a substantial increase (up 90%) compared to the previous year. This was due to a number of factors, including E-Control's strong

media presence and increased marketing of special offers (e.g. by retailers). The Austrian Consumers Association's Energiekosten-Stop campaign led to a sharp rise in the number of callers to the hotline in the fourth quarter of 2013. Apart from enquiries related to such campaigns, the majority of consumers who contact the hotline have questions regarding supplier switching, energy bills and tariff calculations. The hotline can be reached from 8.30-17.30 from Monday to Thursday, and from 8.30-15.30 on Fridays. Consumers who call outside these times can leave a message and their telephone number, and one of our staff returns their call on the following working day.

DISPUTE SETTLEMENT

In accordance with section 26 E-Control Act, and in addition to the Regulation Commission's responsibility for arbitration in disputes between system operators and users (under which official decisions are handed down), E-Control has established a dispute settlement service. All electricity and gas customers, suppliers, system operators, other electricity and gas enterprises and interest groups can submit complaints or disputes to E-Control for arbitration, in particular those concerning gas and electricity bills. E-Control is required to seek a mutually acceptable solution within six weeks.

Electricity and gas companies are legally obliged to cooperate with arbitration proceedings. After obtaining position statements, E-Control issues a non-binding recommendation for resolution of the dispute to the companies.

In addition to its arbitration activities, pursuant to section 22(6) E-Control Act the dispute settlement service is also an important source of information for consumers, providing them with details of their rights and the opportunities presented by the liberalised electricity and gas markets.

In 2013, some 3,071 electricity and gas customers wrote to the dispute settlement service, a 23% jump compared with 2012. The subject of enquiries and complaints ranges from switching supplier and general questions about billing and increased consumption, to problems resulting from price rises and enquiries about payment difficulties and impending disconnection.

THE E-CONTROL WEBSITE

The target group-based design of our website continued to prove its worth in 2013 and was the foundation for satisfying growing interest in certain issues, in particular from energy consumers. This is reflected in the consistently low average bounce rates of around 10% for all start pages and online tools.

The number of visitors to the E-Control website soared by almost 50% in 2013, to 1.3 million. A total of over 8 million pages of content were viewed.

The Consumers section remained the most frequently visited part of the site, accounting for 5 million of the total number of pages accessed, followed by the Businesses and Market Players sections, with the latter accessed very frequently by a relatively small group of visitors. The remaining page hits were fairly evenly spread between other areas of the E-Control website, such as Press, Statistics and Publications.

ONLINE TOOLS

Our functional online applications remain the primary reason for visiting the E-Control website. In 2013 the rise in the use of these tools outpaced that in the total number of visitors to the website.

More than three-quarters of a million consumers used the tariff calculator to identify the most affordable gas and electricity prices – a year-on-year increase of over 70%. Demand for comparisons of electricity prices shot up by 76%, which was significantly stronger than the rise in requests for gas price comparisons, which went up by some 30% year on year.

Use of the mobile tariff calculator – a specially adapted version of the application for smartphones – was over three times higher, clocking up well over 40,000 visits. Since its launch in 2010 the energy saving check has become extremely popular. The application, which enables consumers to identify potential savings in household energy consumption, was used over 120,000 times – more than double the rate in 2012.

The SME energy price check introduced at the start of 2013 allows businesses to compare individually negotiated energy prices with those paid by other companies in the same sector. Considering the size of the target group, which is far smaller than the household segment, the application has also got off to a good start with a total of 12,000 visits.

E-Control's most widely used application in 2013 was again the petrol price database (www.spritpreisrechner.at) launched at the request of the economy ministry, although the number of visitors dropped slightly, probably as a result of the decline in fuel prices during the year. The tool, which lists the cheapest filling stations close to the user's address, registered some 4.5 million hits during the year.

THE SME TARIFF CALCULATOR

A new price comparison tool, the SME tariff calculator, went online at the start of 2014. The number of calls to the E-Control hotline and queries submitted via our online contact form on this topic prior to the launch was an indication of the demand for such an application. Thanks to the tool, small and medium-sized enterprises with electricity consumption of up 100,000 kWh and gas consumption of up to 400,000 kWh can now compare all electricity and gas tariffs.

Over 6,500 businesses used the new application in the first quarter of 2014. Judging by the size of the target group – Austria has around 500,000 SMEs – this figure shows that the new tariff calculator has been very well received, especially considering the fact that the advertising campaign for the application was only launched in the course of the first quarter.

Credits

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